

Stormwater Capacity Analysis for Cameron Run, City of Alexandria, Virginia

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Attachments

- A Methodology for Identifying Public vs. Private Structures: August 6, 2009, Meeting Summary
- B Hydrologic Model Schematic and Parameters
- C Inlet Capacity Results
- D Detailed Model Results

Executive Summary

The City of Alexandria, Virginia, has experienced repeated and increasingly frequent flooding events attributed to old infrastructure, inconsistent design criteria, and possible climate change. The purpose of the Stormwater Capacity Analysis project is to provide a program for analyzing storm sewer capacity issues, identifying problem areas, developing and prioritizing solutions, and providing support for public outreach and education. The project is being implemented by watershed. The watersheds include Hooffs Run, Four Mile Run, Holmes Run, Cameron Run, Taylor Run, Strawberry Run, Potomac River, and Backlick Run.

This technical memorandum (TM) focuses on hydrologic and hydraulic analyses of the Cameron Run watershed using private domain software xpswmm (version 2014sp1). The analyses summarize the storm sewer system in the Cameron Run watershed, the model development steps, data sources and gaps, model

assumptions, and the results, focusing on the capacity deficiencies identified in the model. These deficiencies will be used as a basis for identifying and prioritizing problem areas during the next phase of the project.

The objective of this phase of the project is to identify the deficient stormwater collection system elements in the Cameron Run watershed during a 10-year return period rainfall event. During the Hooffs Run watershed modeling task, three different design storm scenarios and one historic event were investigated: the City's existing intensity duration-frequency (IDF) curve, the updated curve using the full record of historical precipitation data (1949 to 2008), the curve projected for the year 2100 using various climate change scenarios, and the June 25 to 27, 2006 storm event. The results of the Hooffs Run analyses showed that the existing IDF design hyetograph was the most conservative of the design storms (produced the greatest amount of stormwater runoff and flooding), and produced a similar amount of the system flooding to the results from the historic event. Consequently, this scenario was chosen to be used to complete the stormwater capacity analysis for the other watersheds, including the Cameron Run watershed.

The Cameron Run watershed encompasses areas both within and outside of the City and is composed of four hydrologically-separated areas referred hereinafter as Cameron Run West, Cameron Run Center, Cameron Run Southeast, and Cameron Run North. The Cameron Run watershed refers to the combination of these four subwatersheds, which are to be modeled and discussed in this TM. The modeled Cameron Run watershed has a total drainage area of 2.33 square miles with 990 junctions and 934 conduits. Cameron Run West drains to an open channel parallel to Backlick Run before flowing into Cameron Run. Cameron Run Center, Southeast, and North drain directly into Cameron Run.

The ultimate discharge points of Cameron Run West, Cameron Run Center, and Cameron Run North into Cameron Run are upstream of the Cameron Run Southeast discharge locations. The hydraulic model predicts that Cameron Run West, Cameron Run Center, Cameron Run Southeast, and Cameron Run North subwatersheds all have semi-isolated instances of flooding with Cameron Run Southeast having the most issues. The flooding issues are not widespread in the subwatersheds and overall the results indicate that there are no systemic capacity issues. In addition, the model confirmed flooding that the City has experienced in the areas near and downstream of the DASH facility in Cameron Run Center.

The modeling results show that 12 percent of the pipes flood the ground surface, 14 percent have a hydraulic grade line within 2 feet of the surface, and 17 percent surcharge above the crown of the pipe. Comparing the peak runoff to the estimated inlet capacity of each catchment indicates that 76 percent of the total 279 catchments in the model may have insufficient inlet capacity. Maps and profiles of flooding areas are presented in this TM to assist in locating problem areas and understanding the capacity deficiencies of the drainage system.

The hydraulic modeling results presented in this TM should be reviewed with the understanding that several assumptions were made to fill data gaps, primarily assumptions of inverts in pipes with diameters less than 24 inches.

Project Introduction

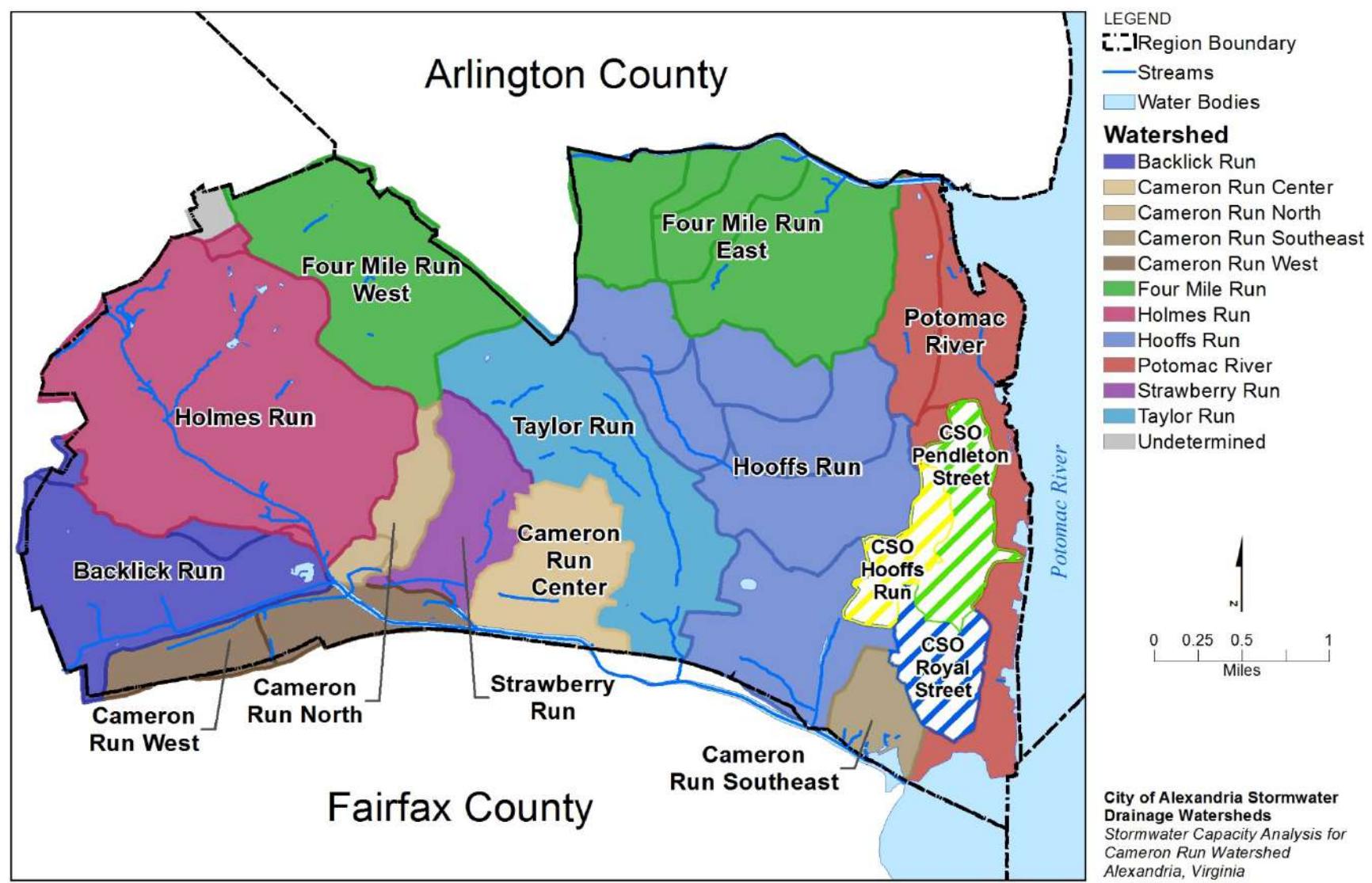
The City of Alexandria, Virginia, (City) has experienced repeated and increasingly frequent flooding events attributed to old infrastructure, inconsistent design criteria, and possible climate change. The purpose of this Stormwater Capacity Analysis project is to provide a program for analyzing storm sewer capacity issues, identifying problem areas, developing and prioritizing solutions, and providing support for public outreach and education. The project is being implemented by watersheds. The watersheds include Hooffs Run, Four Mile Run, Holmes Run, Cameron Run, Taylor Run, Strawberry Run, Potomac River, and Backlick Run.

The purpose of this task is to conduct stormwater capacity analysis for the City's existing stormwater collection system, located in the Cameron Run watershed. Figure 1 presents the various drainage watersheds for the City.

This technical memorandum (TM) describes the methodology and results of the stormwater capacity analysis for the stormwater collection system in the Cameron Run watershed identified in Figure 1 as Cameron Run West, Cameron Run Center, Cameron Run Southeast, and Cameron Run North. Similar TMs describe the results for the other watersheds in the City.

FIGURE 1

Stormwater Drainage Watersheds

City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Task 2 Objectives

The objective of this phase of the study was to identify the deficient stormwater collection system elements during a 10-year return period rainfall storm event.

The stormwater collection system elements include the following:

- Closed conduits, such as gravity mains (storm drains) and culverts
- Open channels, such as streams and trapezoidal channels that connect two pipe systems
- Drainage inlets and junctions, such as roadside curb inlets, manholes, catch basins, ponds
- Flow-regulating structures, such as weirs, orifices, and tide gates

Description of Existing Stormwater Collection System

The City maintains a geodatabase of all stormwater collection system elements, including conduits and drainage junction points. A checked-out copy of the Cameron Run geodatabase received from the City on August 7, 2014 was used as the basis of the stormwater collection system model. The geodatabase was thoroughly reviewed and updated with new survey data for conduits 24 inches and larger collected during a Field Survey and Condition Assessment task. In some locations for which survey data were not available, the City's plan and as-built drawings were used to improve the data quality and rectify system connectivity. The updated geodatabase was submitted to the City for incorporation (that is, checked-in) into the City-wide stormwater collection system geodatabase.

The Cameron Run watershed was subdivided into 282 catchments for modeling purposes. The watersheds of Strawberry Run, Taylor Run, and Hooffs Run divide the Cameron Run watershed into four hydrologically-separate areas referred as Cameron Run West, Cameron Run Center, Cameron Run Southeast, and Cameron Run North with drainage areas as 1.32, 0.60, 0.13, and 0.28¹ square miles, respectively. Cameron Run West drains into an open channel parallel to Backlick Run and then into the Cameron Run, while Cameron Run Center and Cameron Run Southeast drain directly to the Cameron Run. Cameron Run North drains into a tributary of Cameron Run.

The Cameron Run North model also includes a small system that discharges directly to the Holmes Run stream. The system contains 42 junctions, 41 pipes, and discharges an area of 0.02 square miles (11.4 acres). The hydrology of this small system is independent of both the Holmes Run and Cameron Run storm sewer systems since it discharges directly to the stream. This system was originally characterized as belonging to the Cameron Run watershed and checked out with the Cameron Run data, so it was included in the Cameron Run North model, and results for the area are compiled with the remainder of Cameron Run North.

The updated stormwater collection system in the Cameron Run watershed contains the following elements:

- 112,493 linear feet of gravity mains (storm drains) represented by 1,465 pipe segments. Pipe diameter and width varies from 8 to 72 inches for circular, rectangular, elliptical, and arched pipes.
- 1,589 drainage junction points:
 - 31 catch basins
 - 7 culvert points
 - 984 drainage inlets
 - 331 manholes
 - 165 nodes (blind connections)
 - 66 pipe inlet/outlets

¹ The size of the Cameron North watershed is 0.28 square miles. However, the Cameron Run North model includes a small system that discharges directly to Holmes Run. This system's drainage area is 11.44 acres (0.02 square miles), so the total drainage area in the Cameron Run North xpswmm model is actually 0.30 square miles.

- 2 control devices
- 3 storage basins (stormwater ponds)

In addition to the structures represented in the stormwater collection system geodatabase, a network of natural streams and open channels convey storm flows in the City's drainage network. The Cameron Run watershed includes the main stem of Cameron Run, a few unnamed tributaries to Cameron Run, and several smaller stream segments and/or open channels. The main stem and unnamed tributaries are represented separately in the City's geodatabase in a stream feature class but are not included in the capacity analysis. The smaller stream segments and/or open channels that complete the hydraulic connectivity are included in the hydraulic model, but do not exist in the geodatabase.

Public/Private and Disconnected Drainage Systems

The City's geodatabase includes structures that are privately owned. Since the hydraulic analyses and identification of capacity deficiencies include only the public facilities as per direction of the City, the structures located in privately-owned parcels were identified and excluded from the model. The methodology that was used to accomplish this is documented in the meeting minutes presented in Attachment A.

Small, disconnected drainage systems were also identified and excluded from the model. These systems consisted of only a few structures and did not connect to any larger downstream systems. There are several disconnected drainage systems located along Eisenhower Avenue, within the Cameron Run West and Center subwatersheds.

Modeled and Analyzed System

A copy of the updated geodatabase was used as the starting point for the hydraulic model. According to the City's directions, private systems were removed from the modeled system. Despite survey and review of available drawings and documents, small isolated systems remained in the database. The model does not extend beyond the storm sewer outfalls to Cameron Run or its large tributaries; therefore, none of the Cameron Run and its tributaries were modeled.

The modeled system only represents an analysis of approximately 20 percent of the inlets as per the scope of work. Since drainage areas were not computed for each inlet in the model, there were several instances where pipes did not have corresponding flows. This was the case in 603 pipes with diameters of 8 to 24 inches and 9 pipes with diameters of 30 to 72 inches in the upstream-most portions of the system. These pipes that did not receive flow were effectively eliminated from the analysis. Only results pertaining to the analyzed system are included in this TM. The analyzed system includes the following elements:

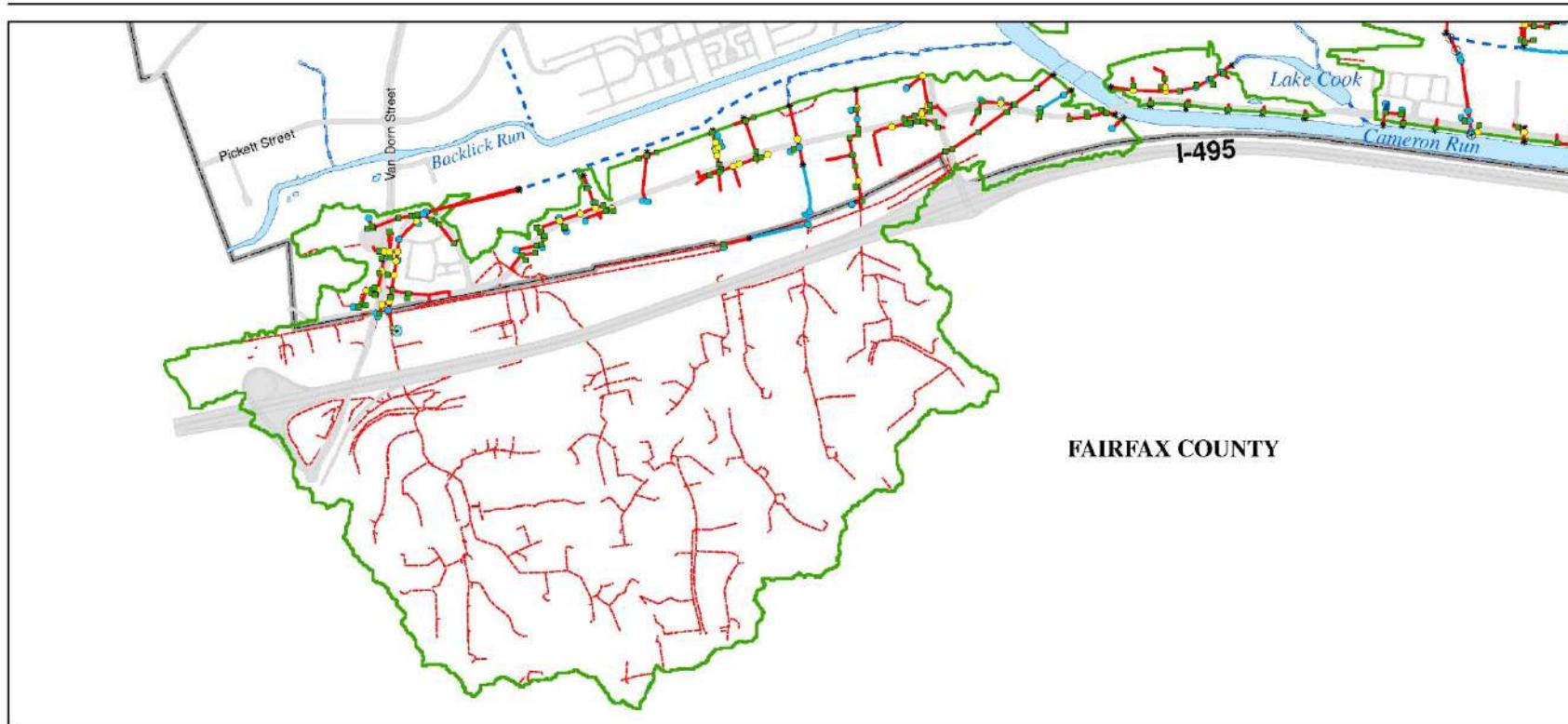
- 82,086 linear feet of gravity mains (storm drains) represented by 790 pipes. Pipe diameter and height varies from 8 to 96 inches for circular, rectangular, and elliptical pipes.
- 851 drainage junction points:
 - 16 catch basins
 - 3 culvert points
 - 403 drainage inlets
 - 259 manholes
 - 113 nodes (blind connections)
 - 53 pipe inlet/outlets
 - 1 control devices
 - 3 storage basins (stormwater ponds)
- 20 open channel segments

Figures 2a, 2b, 2c and 2d show maps of the existing stormwater collection system in the Cameron Run watershed.

FIGURES 2A, 2B, 2C AND 2D

Existing Stormwater Collection System

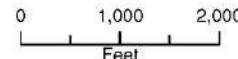
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

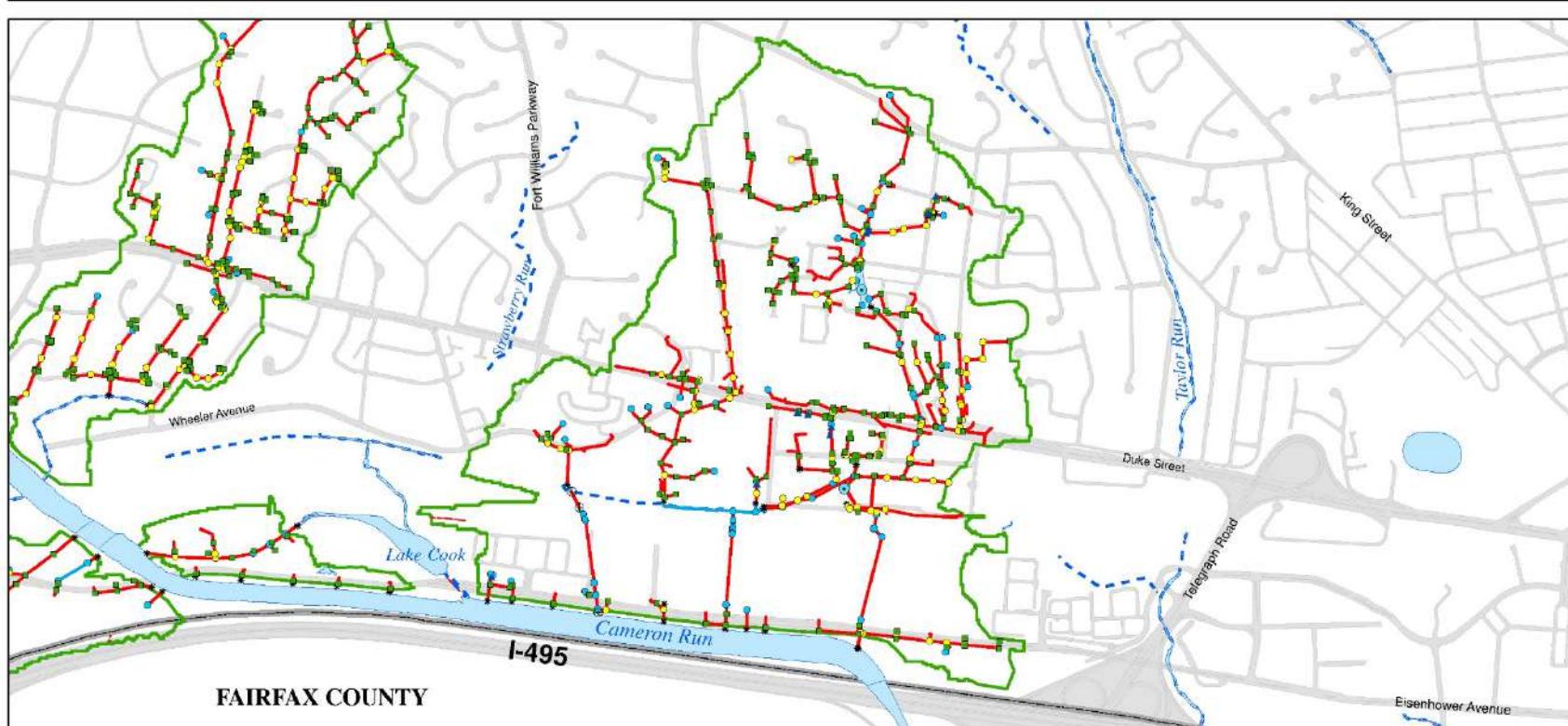
**LEGEND**

- | | | |
|------------------|------------------------|-------------------------------|
| ▲ DCatchBasin | ● DNode | — DCity of Alexandria Streams |
| ★ DControlDevice | * DPipeO | — Modeled Streams |
| ⊕ DCulvertPoint | ● DStorageBasin | ■ Water Bodies |
| ■ DInlet | — DGravityMain | ■ Cameron Run Subwatersheds |
| ◆ DManhole | — Fairfax County Pipes | ■ Roads |

FIGURE 2a

Cameron Run Watershed Stormwater Collection System (West)
Stormwater Capacity Analysis for Cameron Run Watershed
City of Alexandria, Virginia



**LEGEND**

- | | | |
|------------------|------------------------|----------------------------------|
| ▲ DCatchBasin | ● DNode | - - - City of Alexandria Streams |
| ★ DControlDevice | * DPipeIO | — Modeled Streams |
| ⊕ DCulvertPoint | ◎ DStorageBasin | ■ Water Bodies |
| ■ DInlet | — DGravityMain | ■ Cameron Run Subwatersheds |
| ■ DManhole | — Fairfax County Pipes | ■ Roads |

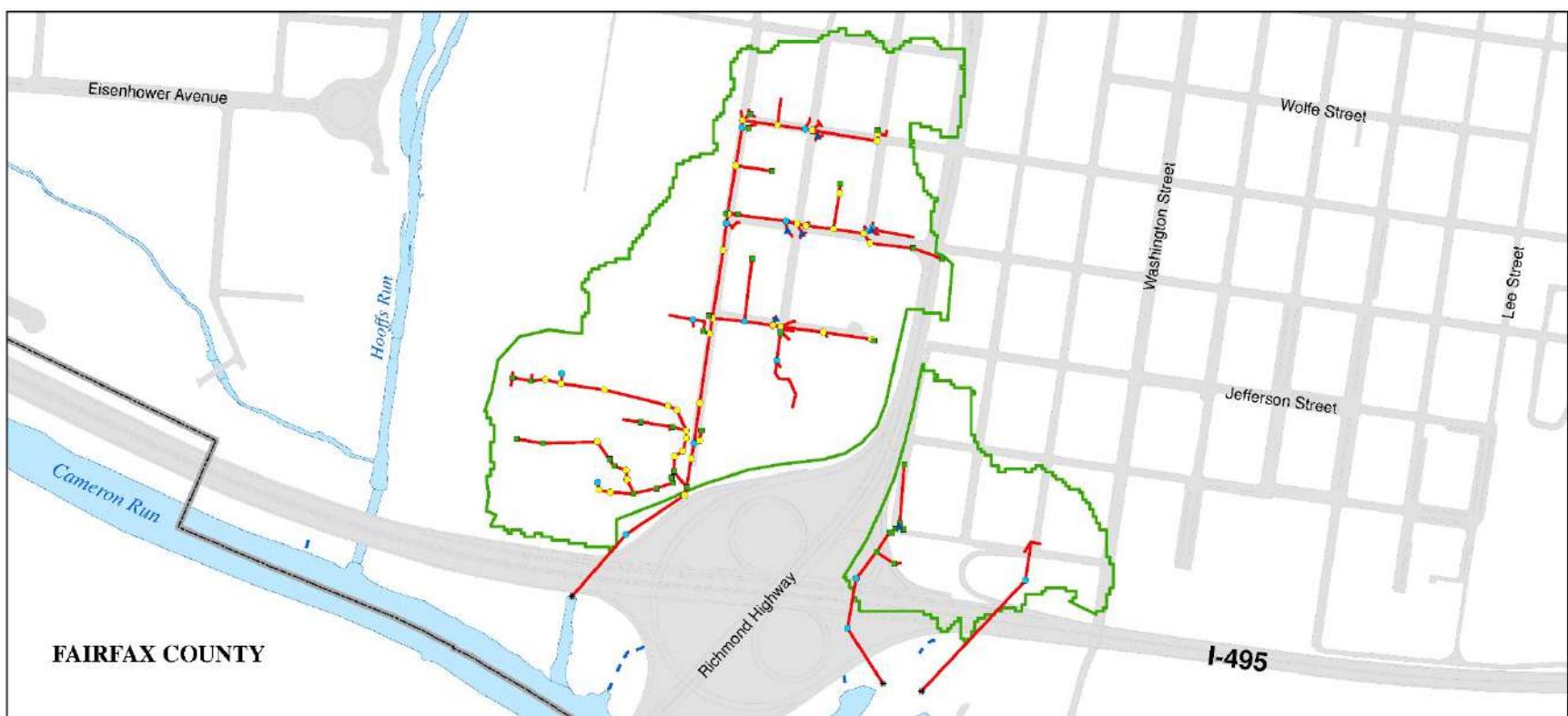
FIGURE 2b

Cameron Run Watershed Stormwater Collection System (Center)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*

0 1,000 2,000
 Feet



CH2MHILL Baker

**LEGEND**

- | | | |
|------------------|----------------------------|----------------------------------|
| ▲ DCatchBasin | ● DNode | - - - City of Alexandria Streams |
| ★ DControlDevice | * DPipeIO | — Modeled Streams |
| ◎ DCulvertPoint | ● DStorageBasin | ■ Water Bodies |
| ■ DInlet | — DGravityMain | ■ Cameron Run Subwatersheds |
| ◆ DManhole | ----- Fairfax County Pipes | ■ Roads |

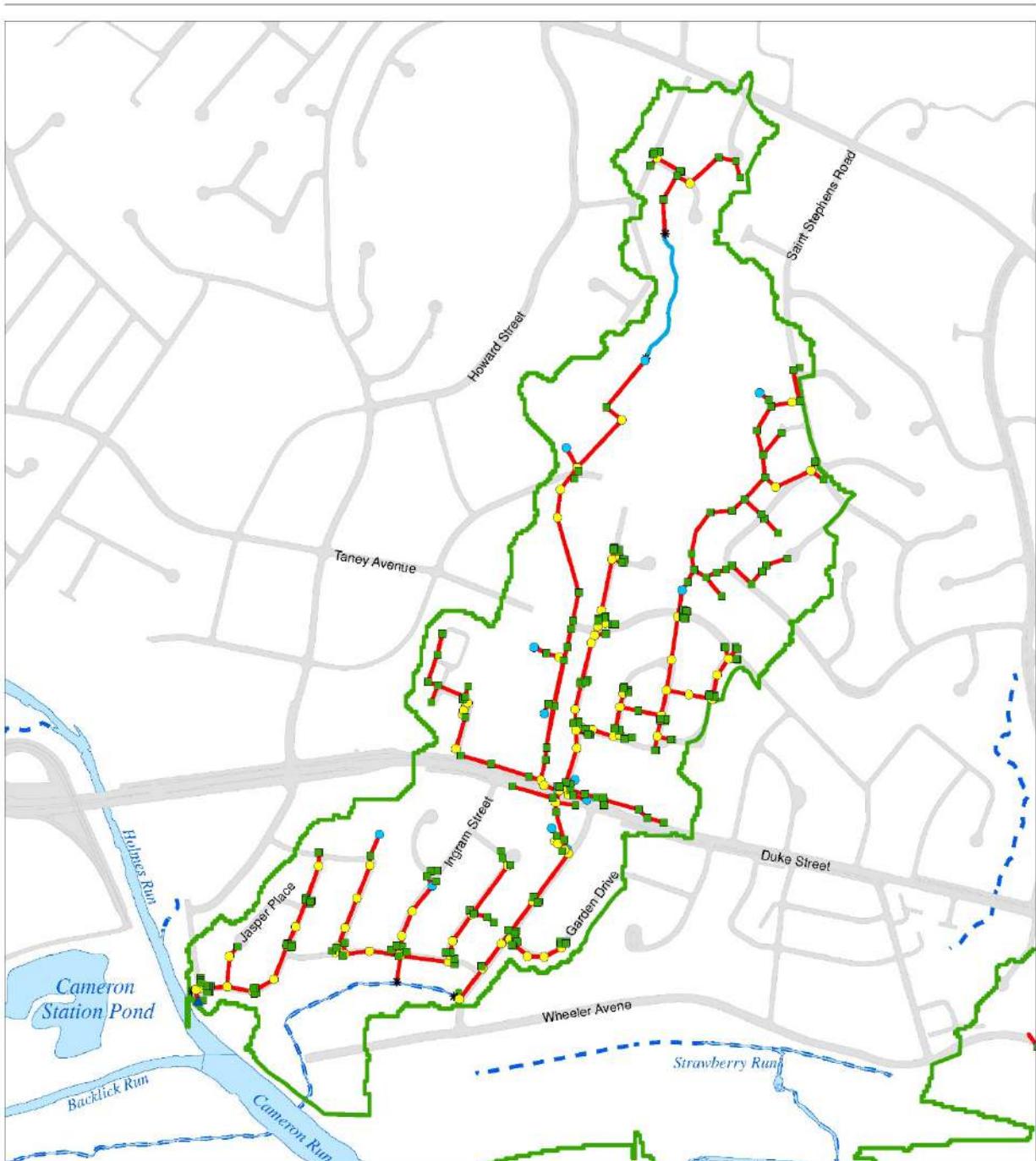
FIGURE 2c

Cameron Run Watershed Stormwater Collection System (Southeast)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*

0 1,000 2,000
 Feet



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- LEGEND**
- ▲ DCatchBasin ● DStorageBasin
 - ★ DCControlDevice — DGravityMain
 - ⊕ DCulvertPoint — Modeled Streams
 - DIInlet
 - DManhole
 - DNode
 - * DPipeIO
 - City of Alexandria Streams
 - Water Bodies
 - Cameron Run Subwatersheds
 - Roads

FIGURE 2d

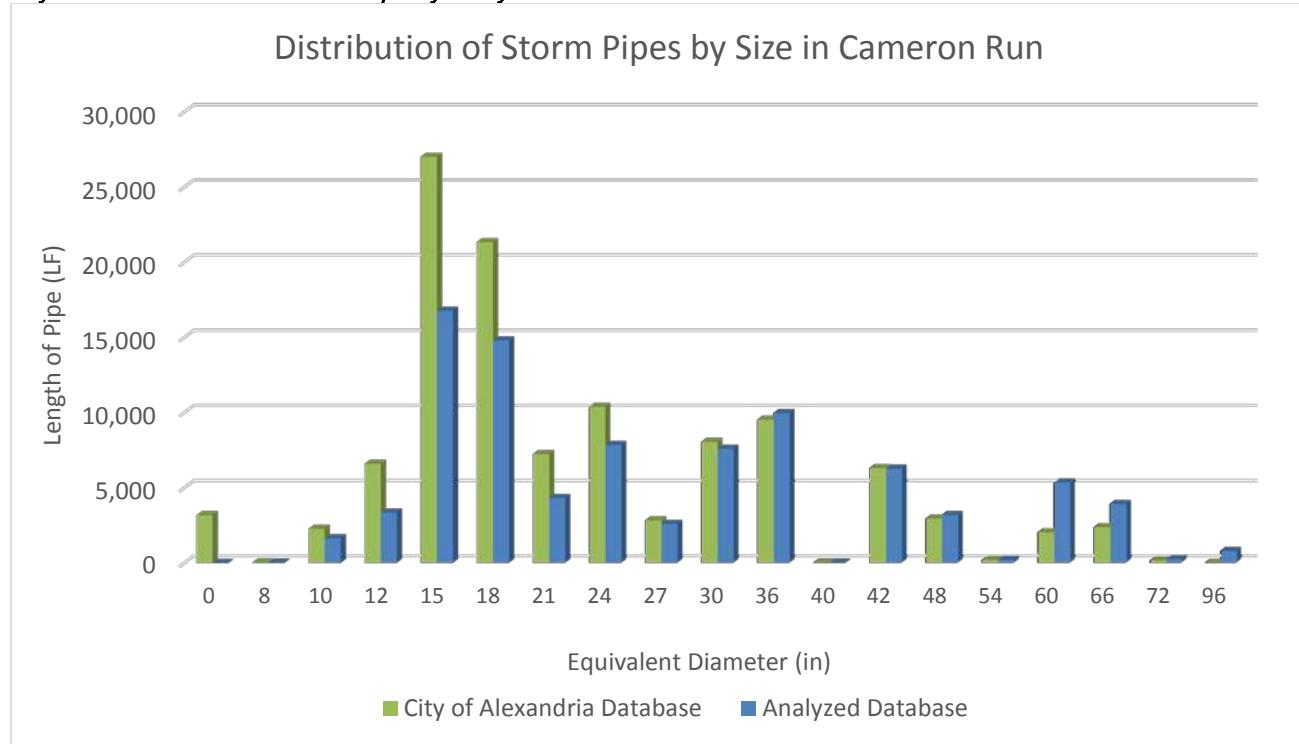
Cameron Run Watershed Stormwater Collection System (North)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*

0 1,000 2,000
 Feet

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The distribution by size of storm drains in the City's Cameron Run geodatabase and the storm drains analyzed in the Cameron Run model is presented in Figure 3. Pipes with diameters less than 24 inches were not analyzed to concentrate simulation upon the major sector of the Cameron Run drainage system. The total linear footages of 36, 48, 60, 66, 72 and 96 inch pipes are greater in the analyzed database. This is because several pipes were added to the model to connect disconnected pipe systems and establish drainage paths across the railroad tracks along Eisenhower Avenue and Business Center Drive, as well as the transport facility belonging to Washington Metropolitan Area Transit Authority between Bluestone Road and Monacan Street (see Figure 2b). Some elliptical pipes were categorized with 0 inch diameters in the original City database. For modeling purposes, pipes with elliptical shapes were converted to circular pipes with equivalent diameters.

FIGURE 3
Distribution of Storm Drains by Size
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run



Data Gaps

The available data for the storm drains in the Cameron Run watershed were evaluated for data quality and completeness. Structures connected to pipes that were less than 24 inches were not surveyed. Approximately 40 percent of the total linear footage of pipes in the modeled Cameron Run watershed database, which does not include private or disconnected structures, are less than 24 inches in size (including pipes with unknown diameter). In addition, there were instances where structures could not be found, were inaccessible, or where lid covers were secured. Data was also missing in locations with blind pipe connections with no access manhole. As a result, many data gaps needed to be filled to develop a complete model. The following approaches were adopted to fill in the missing data:

- Missing data were inferred from the available data, if applicable. For example, a missing pipe size was assumed to equal the downstream pipe diameter.
- Pipe diameters at the most-upstream inlets were assumed to be 12 inches.
- A 6-inch depth to crown was assumed for the most upstream inlets and DNodes.
- Interior point feature invert elevations were estimated by assuming that pipe slope is constant.

- Limited data available in the geographic information system (GIS) for ponds and the outlet control structures were supplemented with data from as-built plans.

In addition to filling in missing data, the data were reviewed for data quality and validity. Assumptions were made when the available data were not reasonable (for example, a pipe crown was above the rim of a manhole). Additional information regarding the types of assumptions made to complete the hydraulic model are provided in the *TM Summary of Data Gaps and Assumptions in the Hooffs Run Watershed* (CH2M HILL, 2012b), which was provided to the City in October 2012. The same approaches were applied to fill data gaps and resolve unreasonable data in the GIS data for the Cameron Run watershed, except where field survey data are available.

Modeling Approach

The Cameron Run watershed was analyzed using commercially available and public domain computer models that are widely used and industry accepted. The public domain software, ArcHydro Tools for ArcGIS 10 (version 2.1) and HEC-GeoHMS (ArcGIS version), were used to aid delineation of catchments and to estimate hydrologic parameters (such as catchment drainage area, slope, and longest flow path). Other hydrologic parameters, such as catchment width and percent impervious, were estimated in ArcGIS after completing the catchment delineation. The private domain software xpswmm (version 2014sp1) was used to simulate rainfall-runoff processes and the performance of the stormwater collection system. The core xpswmm simulation engine is based on the U.S. Environmental Protection Agency (USEPA) stormwater management model (SWMM) engine.

The City provided the following required data:

- Alexandria_Dsewer_CH2M_032114_Cameron, a checked-out copy of the Cameron Run geodatabase of the stormwater collection system
- Spring 2011 DVD, City GIS data (geodatabase and orthophotography), such as topographic data and land use

In addition, Fairfax County provided FairfaxStormwaterData12122011.gdb, a geodatabase of the stormwater collection system and FairfaxPlanimetricData12122011.gdb, a geodatabase of planimetric data.

Hydrologic Modeling

The hydrologic modeling required two major types of inputs:

- **Hydrologic parameters:** Delineation of catchments and computation of hydrologic parameters such as drainage area, slope, width, and percent impervious for each catchment.
- **Design Hyetographs** - Development of a 24-hour synthetic rainfall distribution for the 10-year design storm event

Hydrologic Parameters

Hydrologic parameters were estimated using ArcHydro Tools for ArcGIS 10 (version 2.1) and HEC-GeoHMS (ArcGIS version).

The ArcHydro Tools are a set of public domain utilities developed jointly by the Center for Research in Water Resources (<http://www.crwr.utexas.edu>) of the University of Texas at Austin, and the Environmental Systems Research Institute. These tools provide functionalities for terrain processing, watershed delineation, and attribute management. They operate on top of the ArcHydro data model in the ArcGIS environment.

HEC-GeoHMS is geospatial hydrologic modeling software developed and maintained by the HEC of the U.S. Army Corps of Engineers. The model allows users to visualize spatial information, perform spatial analysis, delineate subbasins, and estimate watershed hydrologic parameters. The model uses the digital elevation model (DEM) of the subject watershed to compute hydrologic parameters. The “burning in”

technique allows the user to impose the drainage system on the terrain to better produce the watershed boundaries (U.S. Army Corps of Engineers [USACE], 2003).

In this study, 2-foot contour data provided by the City were used to create a DEM of the watershed. ArcHydro Tools were used to delineate the catchments (referenced as subbasins in the tools). HEC-GeoHMS was used to compute hydrologic parameters, such as drainage area, slope, and longest flow path for each catchment. Width was derived using the catchment drainage area and longest flow path using the equation, width = (area/longest flow path). Percent impervious was estimated in ArcGIS using the delineated catchments and impervious shapefiles provided by the City.

For catchments that extended outside of the City, data was obtained from Fairfax County to calculate the necessary hydrologic parameters.

A schematic of the hydrologic model for the Cameron Run watershed is presented in Attachment B. The schematic model shows the catchment ID, delineated boundaries, longest flow path, and drainage inlets for each catchment. It also presents the DEM for the watershed. The elevation varies from 8 to 258 feet North American Vertical Datum 1988 (NAVD 88). The hydrologic parameters for each catchment are presented in Attachment B. The following are the major drainage characteristics for the Cameron Run watershed:

- Total drainage area is 2.35 square miles (1,502 acres)
 - Cameron Run West is 1.32 square miles (844 acres)
 - Cameron Run Center is 0.60 square miles (383 acres)
 - Cameron Run Southeast is 0.13 square miles (82 acres)
 - Cameron Run North is 0.30 square miles (193 acres)
- Drainage area divided into 282 catchments, 279 of which produce runoff in the model²
- 43.1 percent of the drainage area is impervious
- Average catchment area is 5.57 acres
- Average catchment slope is 0.067 feet/feet
- Average catchment width is 206 feet

Design Hyetograph

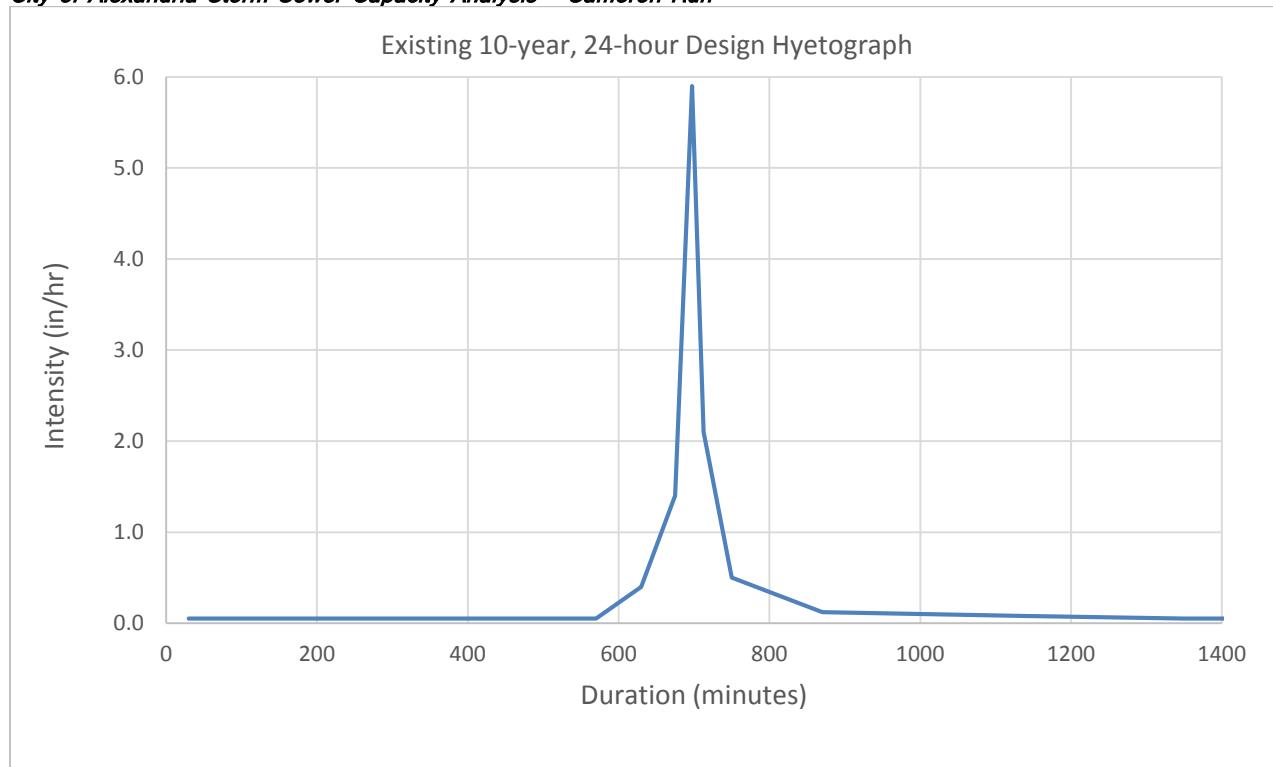
The 24-hour synthetic rainfall distribution for the 10-year design storm event was developed based on rainfall data from the existing intensity-duration-frequency (IDF) curve for the 10-year return period for Alexandria (City of Alexandria, 1989). Time of concentration values were computed for several inlets in the Hooffs Run pilot subwatershed and the FMR priority subwatershed. Based on these results, the peak rainfall intensity was selected from the IDF curve, based on a 15-minute time of concentration. A variable time interval approach was used to generate the design hyetograph. The design hyetograph was developed to yield maximum rainfall intensity at the approximate center of the 24-hour storm. The 24-hour rainfall total is 5.04 inches, and the peak intensity is 5.9 inches per hour (in/hr). Table 1 and Figure 4 present the existing 10-year, 24-hour design hyetograph.

² The xpswmm model includes 60 of the 61 catchments delineated in the Cameron Run North watershed; 1 catchment drains directly to the stream and does not generate runoff in the hydrologic model since it is below the system outfall.

TABLE 1
Existing 10-year 24-hour Design Hyetograph Data
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Start Time (minutes)	Duration (minutes)	Absolute Rainfall Depth (inches)	Intensity (in/hr)
0	60	0.05	0.05
60	60	0.05	0.05
120	60	0.05	0.05
180	60	0.05	0.05
240	60	0.05	0.05
300	60	0.05	0.05
360	60	0.05	0.05
420	60	0.05	0.05
480	60	0.05	0.05
540	60	0.05	0.05
600	60	0.40	0.40
660	30	0.70	1.40
690	15	1.475	5.90
705	15	0.525	2.10
720	60	0.50	0.50
780	180	0.36	0.12
960	360	0.48	0.08
1320	60	0.05	0.05
1380	60	0.05	0.05

FIGURE 4
Existing 10-Year, 24-Hour Design Hyetograph
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run



Simulation of Stormwater Runoff

The xpswmm 2014sp1 software was used to simulate rainfall-runoff processes from the Cameron Run watershed. The hydrologic parameters such as area, slope, width, and percent impervious for each of the 279 catchments were estimated using ArcGIS, ArcHydro Tools for ArcGIS 10, and ArcGIS version of HEC-GeoHMS, as described previously. These hydrologic parameters were used as input to the RUNOFF module of the xpswmm model. The design hyetograph for the 10-year return period was also used as input to the RUNOFF module. The USEPA SWMM Runoff Non-linear Reservoir Method was used to simulate the stormwater runoff from each catchment in response to the hyetograph.

Hydraulic Modeling

The xpswmm model was used to simulate the hydraulic performance of the stormwater collection system during a 10-year design storm event. Model input data included the following physical data:

- Junctions (inlet, manhole, and nodes), such as invert and rim elevations and inlet capacity
- Closed and open conduits, such as invert elevations, size, shape, material, and length
- Stormwater storage ponds, such as stage-storage relationships
- Control devices (orifices and weirs)

The data for the stormwater collection system were primarily imported into the model from the geodatabase provided by the City. This geodatabase was updated with survey data for structures that are attached to pipes 24 inches or more in diameter and considered public. Private structures were not modeled, so any private runoff was applied to the next downstream public inlet. All elevations (invert and rim) recorded in the geodatabase of the stormwater collection system are in NAVD 88 datum; therefore the xpswmm model was built in NAVD 88.

There are several discharge outfalls in the Cameron Run West, Cameron Run Center, and Cameron Run North subwatersheds. One outfall which discharges to Lake Cook, near Cameron Run Regional Park, was modeled with a fixed backwater boundary condition, while all others used a free outfall downstream boundary condition. All three outfalls in Cameron Run Southeast subwatershed were modeled with a tidal control boundary condition. A complete list of outfalls and corresponding boundary conditions is presented in Table 2.

The upstream end of the Cameron Run West subwatershed includes pipes within Fairfax County as well as the City. The pipes within Fairfax County represent the upstream portion of the system. Stormwater from these pipes flows into the City's system and then to an open channel that runs parallel to Backlick Run before flowing into Cameron Run below the confluence of Backlick Run and Holmes Run. All but one outfall were assigned a free discharge boundary condition because they are above the 10-year water surface elevation predicted by the USACE HEC-RAS model at the nearest cross section. The remaining outfall has a fixed backwater boundary condition. The major open channels in the subwatershed run along Eisenhower Avenue to the east of Reserve at Eisenhower Apartments and north of Eisenhower Avenue near the Recycling Drop-off Center.

The Cameron Run Center subwatershed includes several outfalls that discharge directly to Cameron Run. All outfalls were assigned a free discharge boundary condition because they are above the 10-year water surface elevation predicted by the USACE HEC-RAS model at the nearest cross section. The major open channels in the subwatershed are located along and perpendicular to the railroad tracks near the Alexandria Police Department Station.

TABLE 2
Outfall Boundary Conditions
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Node ID	Location	Boundary Condition
Node5163	Cameron Run West	Type 1, Free Outfall
Node5164	Cameron Run West	Type 1, Free Outfall
000222IO	Cameron Run West	Type 1, Free Outfall
000223IO	Cameron Run West	Type 1, Free Outfall
000225IO	Cameron Run West	Type 1, Free Outfall
000230IO	Cameron Run West	Type 1, Free Outfall
000233IO	Cameron Run West	Type 1, Free Outfall
000239IO	Cameron Run West	Type 1, Free Outfall
000242IO	Cameron Run West	Type 1, Free Outfall
000245IO	Cameron Run West	Type2, Fixed Backwater
000234IO	Cameron Run West	Type 1, Free Outfall
000235IO	Cameron Run West	Type 1, Free Outfall
000236IO	Cameron Run West	Type 1, Free Outfall
000237IO	Cameron Run West	Type 1, Free Outfall
000243IO	Cameron Run West	Type 1, Free Outfall
000244IO	Cameron Run West	Type 1, Free Outfall
000250IO	Cameron Run West	Type 1, Free Outfall
000065CP	Cameron Run Center	Type 1, Free Outfall
000248IO	Cameron Run Center	Type 1, Free Outfall
000258IO	Cameron Run Center	Type 1, Free Outfall
000612IO	Cameron Run Center	Type 1, Free Outfall
000611IO	Cameron Run Center	Type 1, Free Outfall
000247IO	Cameron Run Center	Type 1, Free Outfall
000251IO	Cameron Run Center	Type 1, Free Outfall
000257IO	Cameron Run Center	Type 1, Free Outfall
000259IO	Cameron Run Center	Type 1, Free Outfall
000260IO	Cameron Run Center	Type 1, Free Outfall
Node5181	Cameron Run Southeast	Computed Tide Coefficients
Node5182	Cameron Run Southeast	Computed Tide Coefficients
Node5183	Cameron Run Southeast	Computed Tide Coefficients
000146IO	Cameron Run North	Type 1, Free Outfall
000147IO	Cameron Run North	Type 1, Free Outfall
000159IO	Cameron Run North	Type 1, Free Outfall

The Cameron Run Southeast subwatershed is just north of the intersection of Interstate 495 and Richmond Highway (Route 1). The subwatershed drains to other pipes and open channels that discharge into Cameron Run. These downstream pipes and open channels were not modeled because no survey data was available.

The computed tide coefficient boundary condition was used since this area is tidally influenced. A typical existing tidal condition was computed, averaging 6 months of tidal data (February–July 2012) from the Hains Point tidal gauge (station 8594900) in the Potomac River: (elevations in NAVD88)

- Mean higher high water = 2.02
- Mean high water = 1.83
- Mean low water = -0.96
- Mean Lower Low Water = -1.15

The Cameron Run North subwatershed is drained by a small channel north of Wheeler Avenue, which is directly connected to Cameron Run just below the confluence of Backlick Run and Holmes Run. The closed conduit system was modeled as three separate systems with independent outfalls, two of which discharge to the stream north of Wheeler Avenue, one of which discharges directly to Holmes Run. All three outfalls were assigned a free discharge because they are above the 10-year water surface elevation predicted by the USACE HEC-RAS model at the nearest cross section. There is one small open channel in the Cameron Run North subwatershed that is included in the model to complete the hydraulic connectivity east of Gaillard Street on the western edge of the St. Stephens Upper School campus.

The open channel reaches described previously (for example, road side swales and open channels connecting pipe systems) were digitized using aerial photography. Cross sections for the model were estimated using the DEM generated from the 2-foot contours available in the City's GIS data and length, slope, and Manning's n roughness values were estimated using aerial photos and contour data.

It should be noted that unlike Hooffs Run, the xpswmm modeling for Cameron Run does not include storage junctions at manholes on pipes 36 inches in diameter or larger. The storage junctions were originally included in the Hooffs Run Task 2 model at the request of the City to simulate the storage that occurs in the junction boxes between two larger-diameter pipes. However, there were issues identified with the use of storage nodes in combination with allowing ponding in xpswmm. It was determined that eliminating the storage function would have a lesser impact on the model than turning off the ponding and losing flow from the model.

Additionally, entrance and exit loss values were adjusted in the hydraulic model as compared to the Hooffs Run Task 2 model. Closer review of xpswmm computations revealed that the model does not take downstream velocity into consideration when computing entrance and exit losses on pipes. Because xpswmm is not accounting for the downstream velocity, the model assumes flows are entering a reservoir, which overestimates head loss. To compensate for this nuance, entrance losses were lowered to 0.1 from 0.5, and exit losses were lowered to 0.15 from 1.0.

The hydraulic modeling was performed to analyze the pipe capacities by loading the runoff directly into the nodes of the modeled storm sewer system. This approach does not model the flow restrictions caused by the surface inlets. The flow directly entering the collection system provides a conservative or “worst case” evaluation of pipe capacities.

Model Results

Model results are summarized in the following sections.

Hydrologic Model Results

Peak runoff discharge for each node where overland flow was loaded into the hydraulic model is provided in Attachment C.

Inlet Capacity Results

Inlet capacity was evaluated outside the xpswmm software because of the limitations in the modeling software's capabilities. Details on the evaluation of the options for modeling inlet capacity are provided in *Inlet Capacity Analysis for City of Alexandria Storm Sewer Capacity Analysis* (CH2M HILL, 2012a), which was

provided to the City in September 2012. The spreadsheet evaluation multiplies the maximum capacity of a single inlet, estimated to be 3.25 cubic feet per second based on an assumed standard gutter spread and road cross-section, by the total number of catch basins and inlets draining to a single runoff input point, the location where overland flow was plugged into the hydraulic model. The model has flow loaded into 279 locations with an average of 1.4 inlets per runoff input point. The estimated capacity for each load point was compared to the peak runoff generated in the RUNOFF module of the xpswmm software to determine whether the catchment has sufficient inlet capacity. Results suggest that about 76 percent or 213 of 279 of the model load points, representing 76 percent of the Cameron Run drainage area, may be experiencing inlet capacity deficiencies.

The total inlets and catch basins count is based on the City's GIS data for the Cameron Run watershed, including all private and disconnected inlets and catch basins. The City's GIS data does not include all private structures in the Cameron Run watershed since they are not always included in survey efforts. This effectively underestimates the City's available inlet capacity in this analysis. Inlet capacity results are presented in detail in Attachment C.

Hydraulic Model Results

Model results for the pipes and stream segments are summarized in the following sections. Detailed results are presented in Attachment D.

In October of 2014, the City requested the portion of the preliminary Cameron Run model associated with the area of the DASH (Driving Alexandria Safely Home) Bus Facility in advance of this TM. The City has had flooding issues in the immediate downstream area of the facility. After City review, the model was updated to include City known system configuration that was not captured by the survey.

Pipe Capacity

The conveyance capacity of the existing stormwater collection system during the storm event listed previously was evaluated based on three criteria, listed in order of decreasing severity:

- If the hydraulic grade line (HGL) rose above the ground surface, the structure was considered flooded.
- If the HGL rose to within 2 feet of the ground surface, the structure was considered to have insufficient freeboard.
- If the HGL rose above the crown of the pipe but was more than 2 feet from the ground surface, the structure was considered surcharged.

Pipes were evaluated for these conditions at the upstream end. In some cases the water surface was within 2 feet of the ground surface, but within the pipe (not surcharging), because the crown of the pipe was less than 2 feet from the ground surface. In those cases, the pipes were not included in the "insufficient freeboard" category.

The pipes with flooded, insufficient freeboard and surcharged conditions are summarized in Table 3 and 4. A plan view of the Cameron Run watershed is provided in Figures 5a, 5b, 5c, and 5d depicting the pipes experiencing flooding, insufficient freeboard, and surcharged conditions. Profiles which display the conditions of the pipes along the main storm sewer line within the Cameron Run watershed can be found in Attachment D.

The example profiles display the following:

- Vertical cross-sectional view of the conduits, including the inverts and crowns. They also illustrate the flow conditions such as partially full, full, or surcharged.
- Water surface elevation (HGL) in the conduit
- HGL in junctions such as manholes, inlets, and nodes

- HGL above the conduit crown (surcharged conditions)
- HGL above the ground (flooding)

Note that the profiles presented only show a snapshot of the system during the model simulation. These profiles will not always show the most severe flooding at each location. For example, the profile may not show the flooding symbol at a location even though surface flooding does occur either before or after the snapshot of the profile was taken.

The detailed model results are presented in tabular format in Attachment D. The results presented in this TM should be reviewed with the understanding that flow data were not available for model calibration, and several assumptions were made to fill data gaps, primarily assumptions about pipe inverts where survey data were unavailable.

The model results presented in Table 3 show that 12 percent of the pipes flood the ground surface, 14 percent have a hydraulic grade line within 2 feet of the surface, and 17 percent surcharge above the crown of the pipe. Cameron Run West, Cameron Run Center, Cameron Run Southeast, and Cameron Run North subwatersheds all have semi-isolated instances of flooding. An example of one of these semi-isolated areas of flooding is near the DASH facility. As documented by the City, the model confirmed that areas near and downstream of the DASH facility in Cameron Run Center are experiencing flooding. Additionally, the Cameron Run Southeast subwatershed includes more issues than the other subwatersheds. The flooding issues are not widespread in the sheds and overall the results indicate that there are no systemic capacity issues.

TABLE 3
Watershed Modeling Results, Summarized by Pipe Size
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Equivalent Pipe Diameter (ft)	Sufficient Capacity			Surcharged			Insufficient Freeboard			Flooded		
	Count	Length (LF)	Percent of Total Length	Count	Length (LF)	Percent of Total Length	Count	Length (LF)	Percent of Total Length	Count	Length (LF)	Percent of Total Length
Less than 2.0	224	19,844	24	62	3,709	5	70	5,210	6	63	6,302	8
2.0 to 2.75	81	8,875	11	44	4,636	6	23	2,498	3	17	1,987	2
3.0 to 4.9	74	10,444	13	34	4,120	5	26	3,141	4	14	1,754	2
5.0 to 10	46	7,975	10	10	1,188	1	2	404	0	0	0	0
Total	425	47,139	57	150	13,653	17	121	11,252	14	94	10,042	12

Note: Table does not include pipes upstream of hydrologic load points in the model

Results are based on results at upstream end of pipe

ft = feet

LF = linear feet

TABLE 4
Watershed Model Results, Summary by Capacity
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Capacity	Conduit Count	Conduit Length (LF)	Percent of Total Length	Duration (hr)				Volume (ft ³) ^a			
				Max.	Min.	Avg.	Total	Max.	Min.	Avg.	Total
Sufficient Capacity	425	47,139	57	-	-	-	-	-	-	-	-
Surcharged ^b	150	13,653	17	55.1	0.1	1.3	453	-	-	-	-
Insufficient Freeboard	121	11,252	14	-	-	-	-	-	-	-	-
Flooded	94	10,042	12	11.3	0.1	0.8	73	1,016,991	0.32	22,527	2,117,542

Notes: All results presented for pipe segments based on capacity at upstream end of pipe.

^a Flooded volume

^b Duration of surcharged flow includes time during which conduits have insufficient freeboard or are flooded at the upstream end.

ft³ = cubic feet

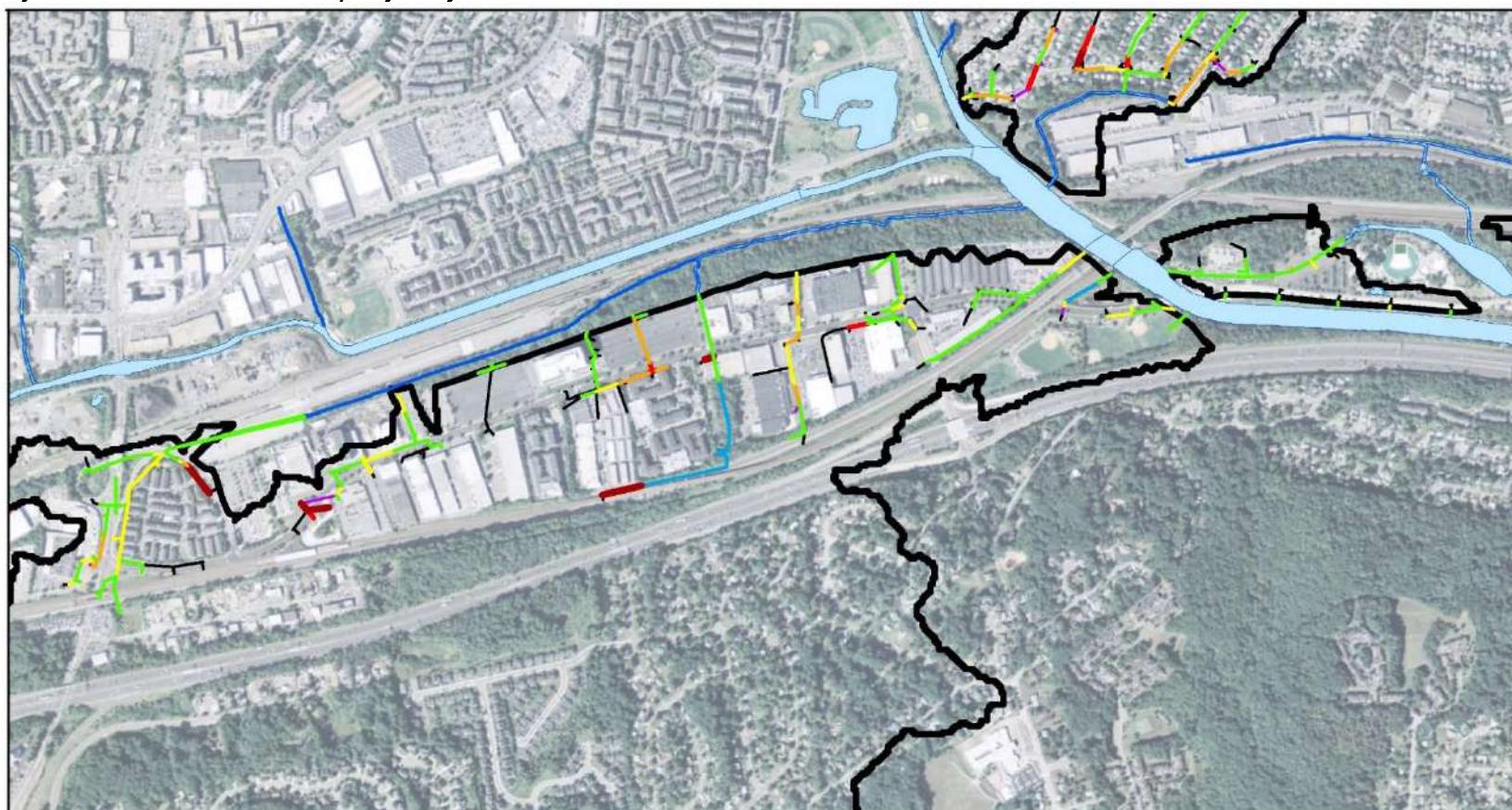
hr = hour

LF = linear feet

FIGURES 5A, 5B, 5C AND 5D

Watershed Modeling Results

City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

**LEGEND****Model Results**

- Sufficient Capacity
- Surcharged Insufficient Freeboard
- Insufficient Freeboard

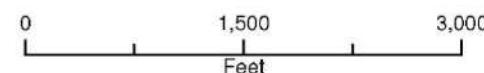
Flooded Volume (cu. ft.)

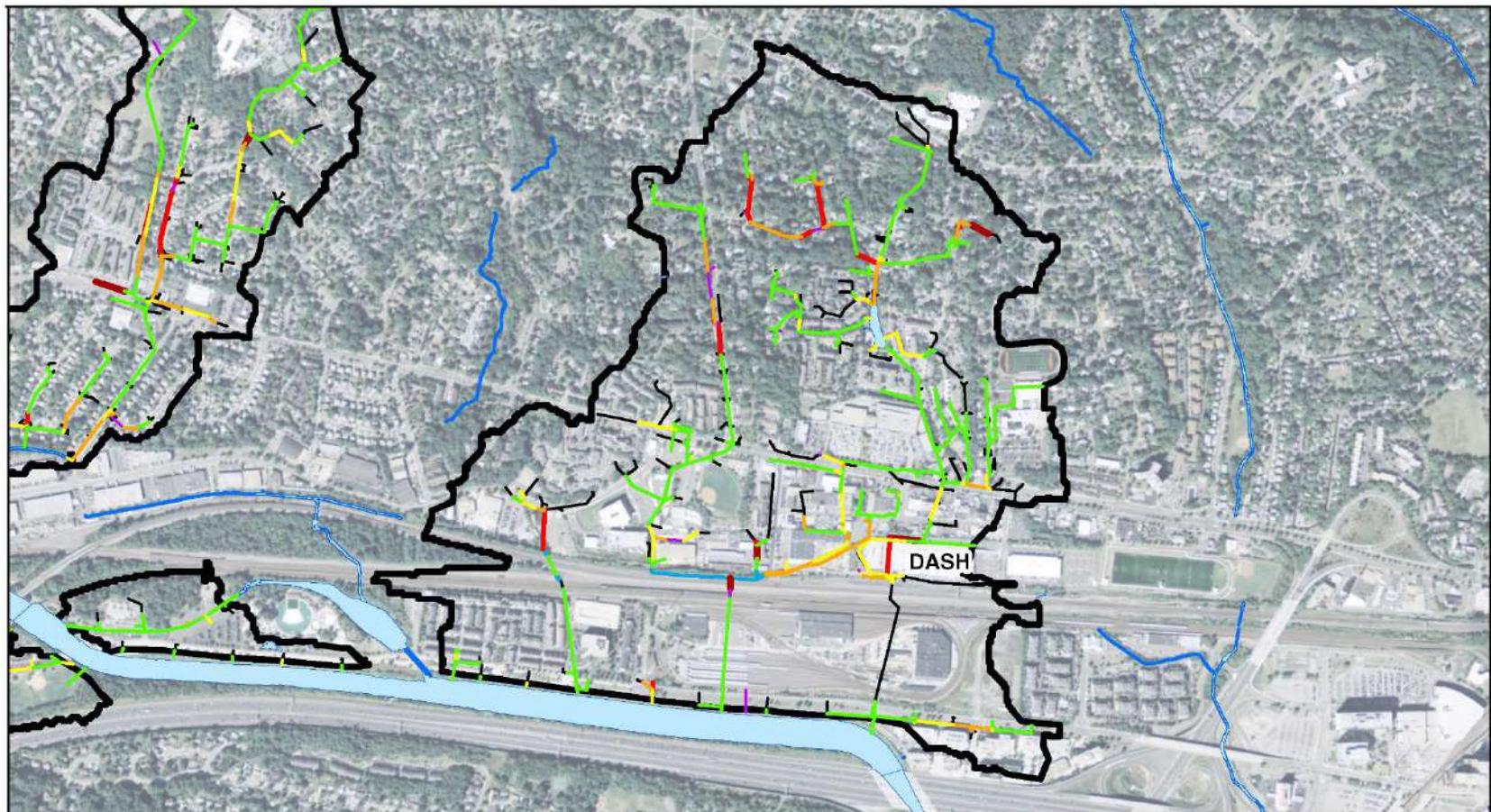
- 0.1 - 1,000
- 1,000 - 10,000
- 10,000 - 1,018,000
- Not Analyzed
- (Private, disconnected, upstream of runoff input)

- Modeled Streams
- City of Alexandria Streams
- Water Bodies
- Subwatersheds

FIGURE 5a

Cameron Run Watershed Modeling Results (West)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*



**LEGEND****Model Results**

- Sufficient Capacity
- Surcharged
- Insufficient Freeboard

Flooded Volume (cu. ft.)

- 0.1 - 1,000
- 1,000 - 10,000
- 10,000 - 239,000
- Not Analyzed
(Private, disconnected,
upstream of runoff input)

Modeled Streams

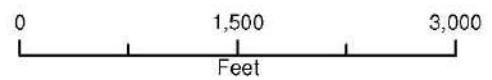
City of Alexandria Streams

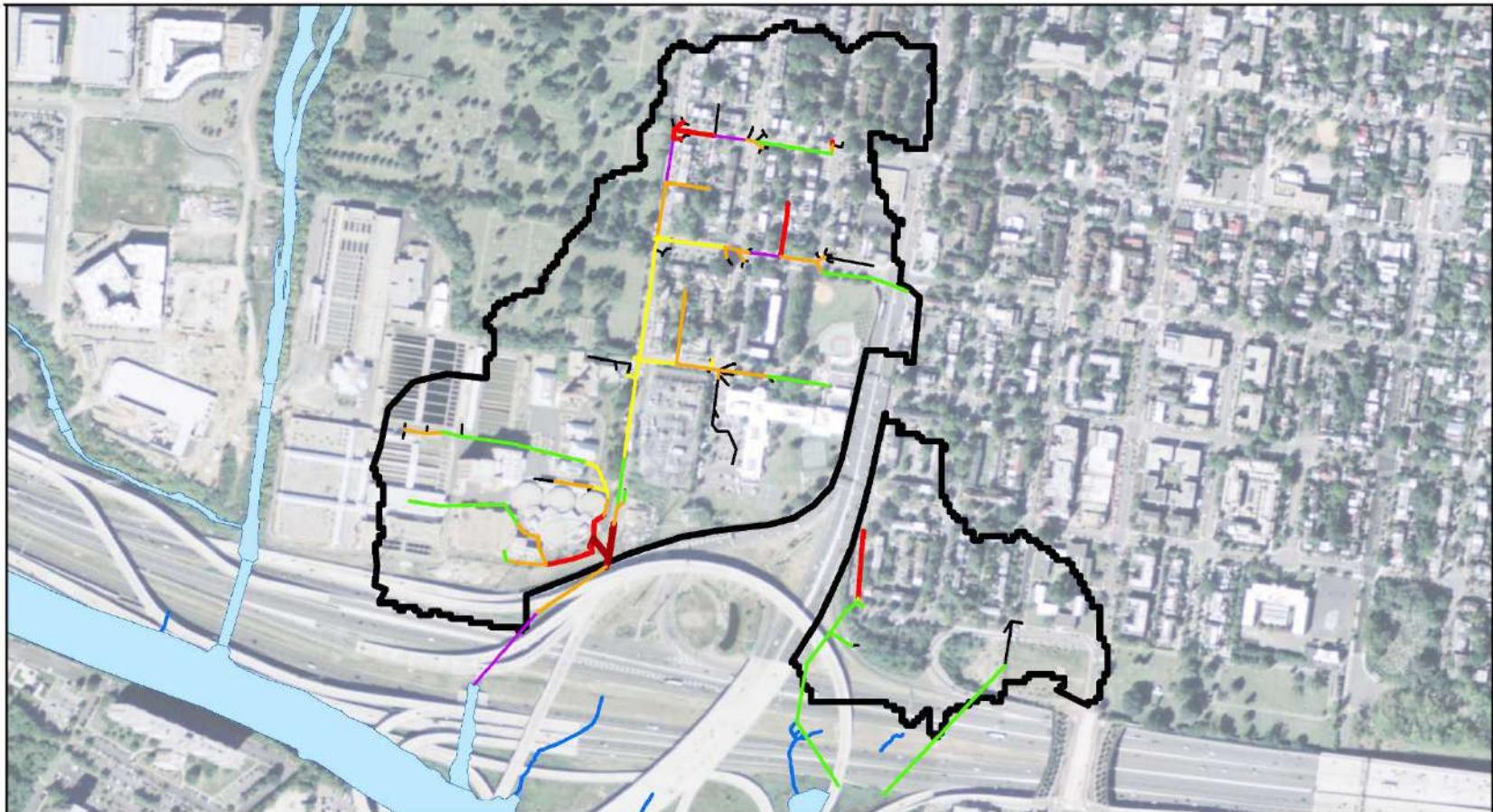
Water Bodies

Subwatersheds

FIGURE 5b

Cameron Run Watershed Modeling Results (Center)

Stormwater Capacity Analysis for Cameron Run Watershed
City of Alexandria, Virginia

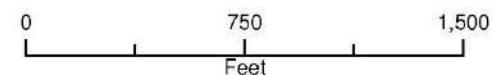
**LEGEND**

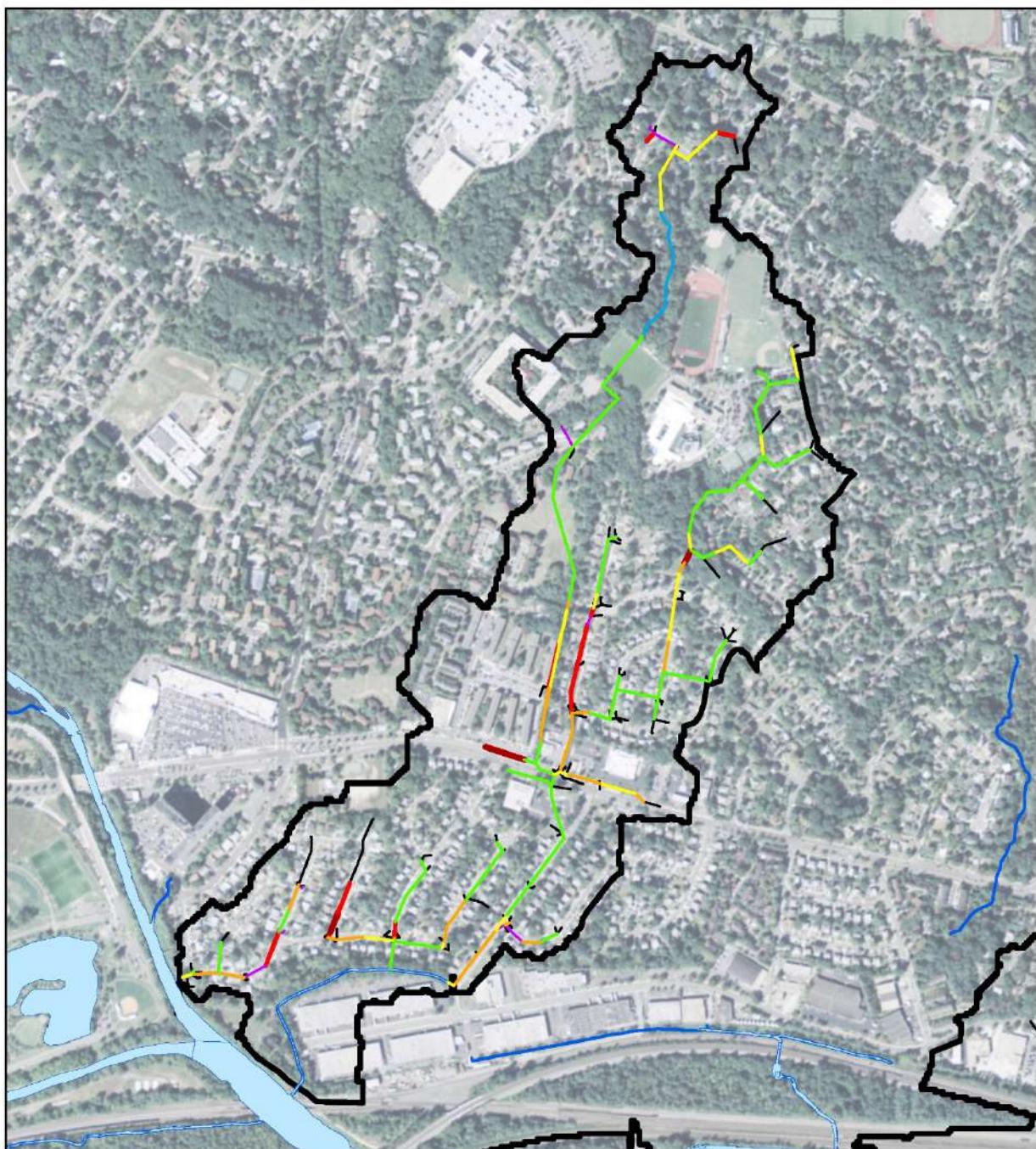
Model Results		Flooded Volume (cu. ft.)
Sufficient Capacity		0.1 - 1,000
Surcharged		1,000 - 10,000
Insufficient Freeboard		10,000 - 21,000
		Not Analyzed (Private, disconnected, upstream of runoff input)

- Modeled Streams
- City of Alexandria Streams
- Water Bodies
- Subwatersheds

FIGURE 5c

Cameron Run Watershed Modeling Results (Southeast)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*



**FIGURE 5d**

Cameron Run Watershed Modeling Results (North)
*Stormwater Capacity Analysis for Cameron Run Watershed
 City of Alexandria, Virginia*

0 750 1,500
 Feet

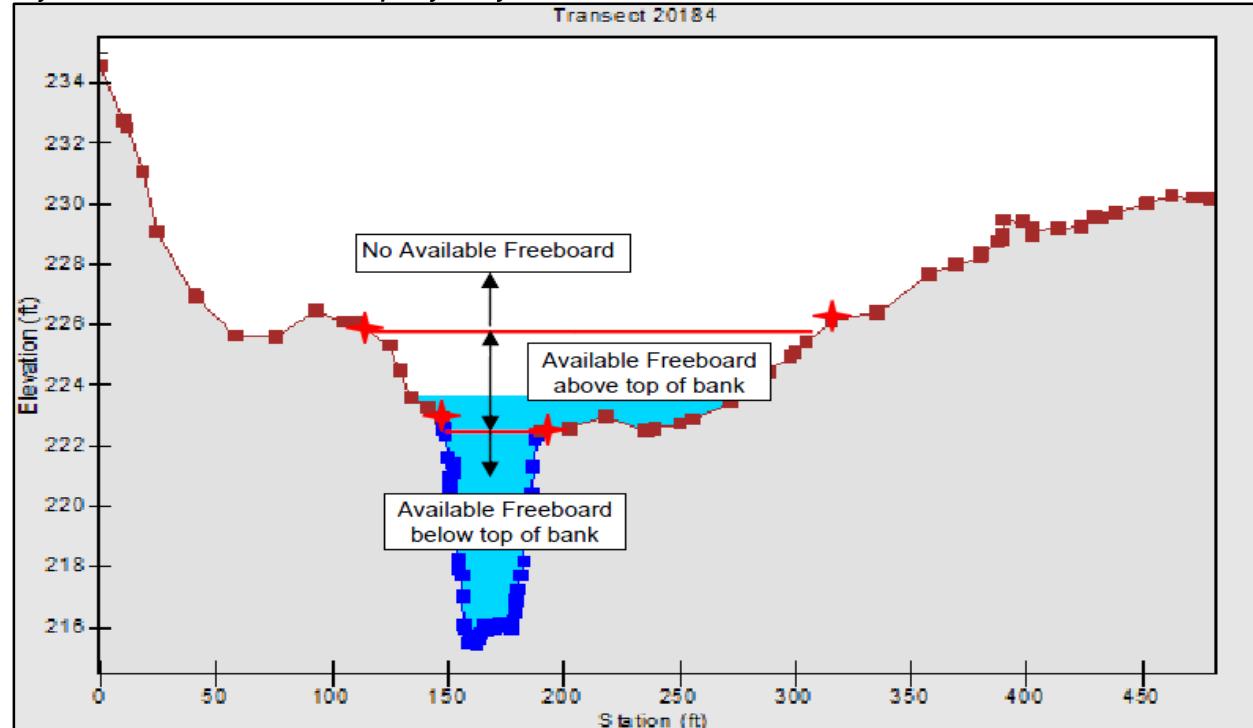
CH2MHILL Baker

Open Channel Results

Water surface levels generated by the model were compared to two points defined on each cross section: top of cross section and top of bank. These points are defined in Figure 6. The conveyance at each cross section was then defined as falling into one of three categories:

- No available freeboard: HGL above the top of cross section
- Available freeboard above top of bank: HGL above the top of bank yet remained below the top of cross section
- Available freeboard below top of bank: HGL below the top of bank

FIGURE 6
Sample Cross Section
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run



Data on open channel segments were defined by the most recent topographic data provided by the City. While included, open channels were not the focus of this modeling effort, and therefore the capacity of open channels will not be reported in terms other than those described in this section. Results for stream segments are summarized in Table 5.

TABLE 5
Summary Results for Open Channels in Cameron Run
City of Alexandria Storm Sewer Capacity Analysis – Cameron Run

Scenario	Linear Feet of Stream		
	Available Freeboard Below Top of Bank	Available Freeboard Above Top of Bank	No Available Freeboard
Existing IDF, existing boundary conditions	2,414	992	534

Some major open channels that were analyzed to create Table 5 are located along Eisenhower Avenue to the east of Reserve at Eisenhower Apartments in Cameron Run West; north of Eisenhower Avenue near the

Recycling Drop-Off Center in Cameron Run West; along and perpendicular to the railroad tracks near Alexandria Police Department Station in Cameron Run Center; and near Orleans Place at Gaillard Street on the western edge of the St. Stephens Upper School property in Cameron Run North. The water elevations of most of the open channels appear to have enough capacity so that the water surface elevation of the 10-year storm does not reach any surrounding structures.

Summary

The hydraulic model predicts that only isolated portions of the Cameron Run watershed are experiencing capacity deficiencies during the 10-year, 24-hour design storm with the Cameron Run Southeast subwatershed having the most issues. As documented by the City, the model confirmed flooding in the areas near and downstream of the DASH facility in Cameron Run Center. The model results show that 12 percent of the pipes flood the ground surface, 14 percent have a hydraulic grade line within 2 feet of the surface, and 17 percent surcharge above the crown of the pipe. Comparing the peak runoff to the estimated inlet capacity of each catchment indicates that 76 percent of the catchments in the model may have insufficient inlet capacity. Maps and profiles of flooding areas are presented in this TM to assist in locating problem areas and understanding the capacity deficiencies of the drainage system.

The hydraulic modeling results presented in this TM should be reviewed with the understanding that several assumptions were made to fill data gaps, primarily assumptions of inverts of pipes with diameters less than 24 inches.

References

These documents were consulted in the preparation of this memorandum. Not all are cited in the text.

City of Alexandria. 1989. *Design and Construction Standards*. Department of Transportation & Environmental Services. July.

City of Alexandria. 2011. City of Alexandria GIS data. Spring.

CH2M HILL. 2009a. *Updated Precipitation Frequency Results and Synthesis of New IDF Curves for the City of Alexandria, Virginia*. Prepared for City of Alexandria Transportation & Environmental Services Department. May 1.

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CH2M HILL. 2012b. *Summary of Data Gaps and Assumptions in the Hooffs Run Watershed*, Prepared for the City of Alexandria Transportation & Environmental Services Department. October 22.

CH2M HILL. 2016. *Stormwater Capacity Analysis for Hooffs Run Watershed, City of Alexandria, Virginia*. Prepared for the City of Alexandria Transportation & Environmental Services Department. February.

U.S. Army Corps of Engineers (USACE). 2003. *User's Manual, Geospatial Hydrologic Modeling Extension HEC-GeoHMS*. Hydrologic Engineering Center, the US Army Corps of Engineers. Version 1.1. December.

Attachment A

Methodology for Identifying Public vs. Private

Structures: August 6, 2009, Meeting Summary

City of Alexandria Storm Sewer Capacity Analysis Project – Task Order 1

Meeting, August 6, 2009 (2:30-3:00 pm)

ATTENDEES:

Craig Perl/City of Alexandria
Laurens van der Tak/CH2M HILL
Cheri Salas/ CH2M HILL

FROM: Cheri Salas/CH2M HILL

DATE: August 7, 2009

PROJECT NUMBER: 383412

Meeting Purpose

Review memorandum dated July 31, 2009, entitled Evaluation of modeling issues discussed during July 27, 2009 Progress Meeting

- Discuss results of initial public\private structure determinations
- Review initial evaluation of survey data quality
- Discuss altered approach to filling data gaps associated with missing inlet inverts

Meeting Review

Private vs. Public Structures

It was difficult to readily identify structures as private or public, based solely on the parcel layer because of potential errors in the structure locations. The memorandum includes several examples. Several of these include individual public structures that are upstream of larger private storm sewer areas. Craig will share these with Suzanne and others to confirm a path forward. It was agreed that regardless of the path forward on future sewersheds, we would not change the model for the pilot sewershed, but will not attempt to evaluate capacity limitations in the private areas. Craig will confirm which areas in the memo examples should be evaluated.

As we move into the remainder of Hooffs Run CH2M HILL will identify large areas of private sewers based on a broad visual review of the sewersheds, CH2M HILL will recommend a starting point for the hydraulic model (pour point for hydrologic basin) and allow the City to review the recommendations prior to beginning filling data gaps or modeling.

Stormwater ponds were discussed. These are mostly, if not all, private facilities; however they should have significant impact on the peak flows in the system. It was recognized that there is significant effort associated with obtaining the data for these ponds, and adding it to

the model. The one pond in the pilot sewershed was retrofitted since the as-built plans; therefore a site visit may be required to obtain appropriate outlet dimensions.

Survey Data Quality

We do not foresee any significant data issues in the Pilot sewershed related to surveyed inverts; however it may be a bigger issue as we move into flatter sewersheds. This issue will be tabled until we move on to other sewersheds

Filling Data Gaps in Inlet Inverts

As we were filling data gaps we recommended using a 1-foot depth to invert for all inlets for which the data were not available. In approximately 15 of the 153 inlets for which invert data were not available, the pipe diameter was larger than 12-inches, resulting in model errors. A revised approach of using the pipe diameter plus 6-inches as the assumed depth to invert is recommended, however it is unclear whether this approach will be appropriate for the locations in question. CH2M HILL will provide a Google Earth Map of these inlets and Craig will review, and possibly conduct field inspections. CH2M HILL will not continue modeling of the pilot shed until results of this review are received.

Action Items

Craig will share July 31, 2009 memo with additional City staff and determine extent of capacity evaluation in pilot area. He will also confirm recommended path forward.

Craig will determine preferred approach to inclusion of stormwater ponds in the model.

Cheri will provide Google Earth maps of locations where a 1-foot depth to invert was not sufficient.

Craig will review these sites and provide input on an appropriate assumption moving forward.

Attachment B
Hydrologic Model Schematic and Parameters

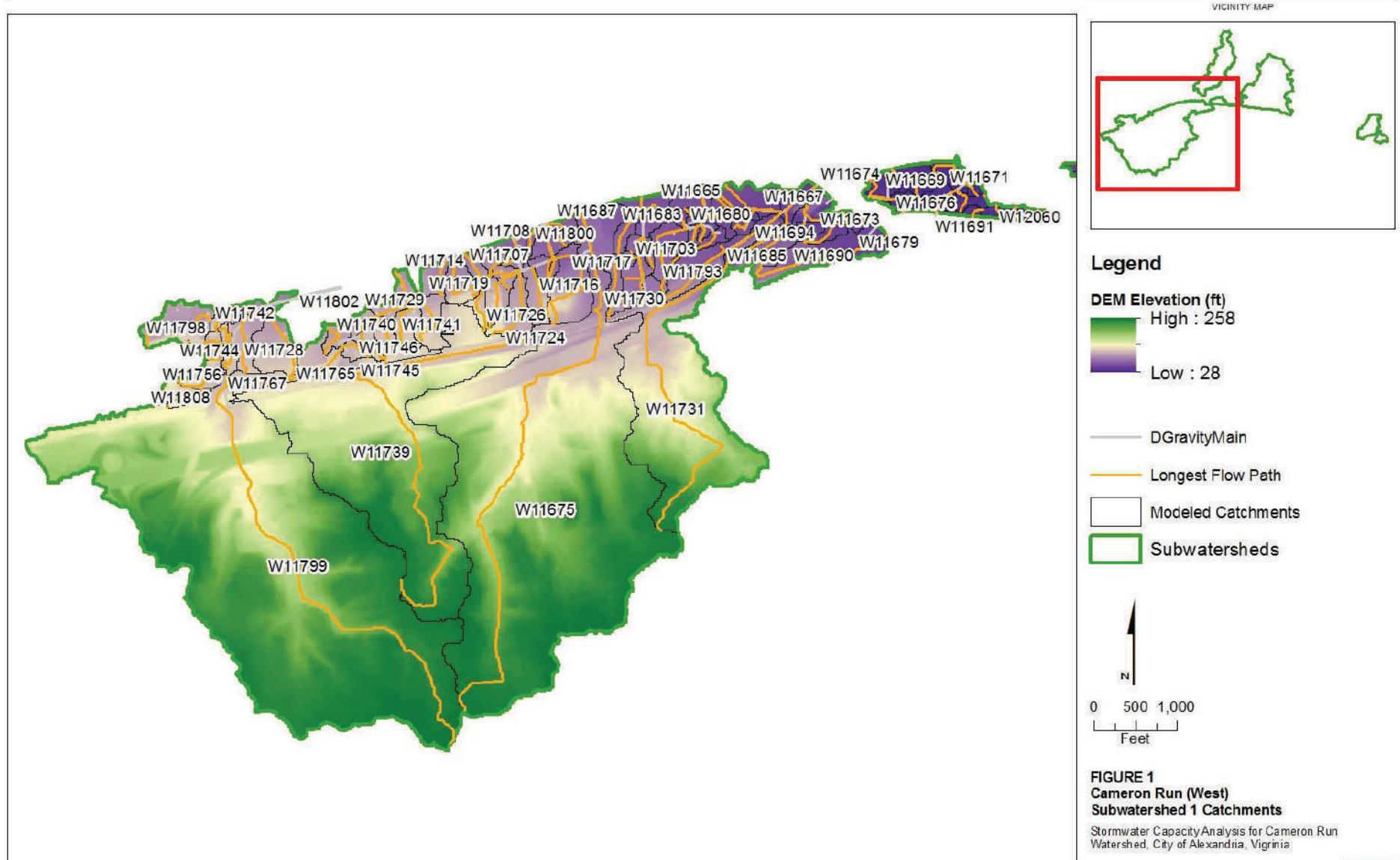


FIGURE 1
Cameron Run (West)
Subwatershed 1 Catchments

Stormwater Capacity Analysis for Cameron Run Watershed, City of Alexandria, Virginia

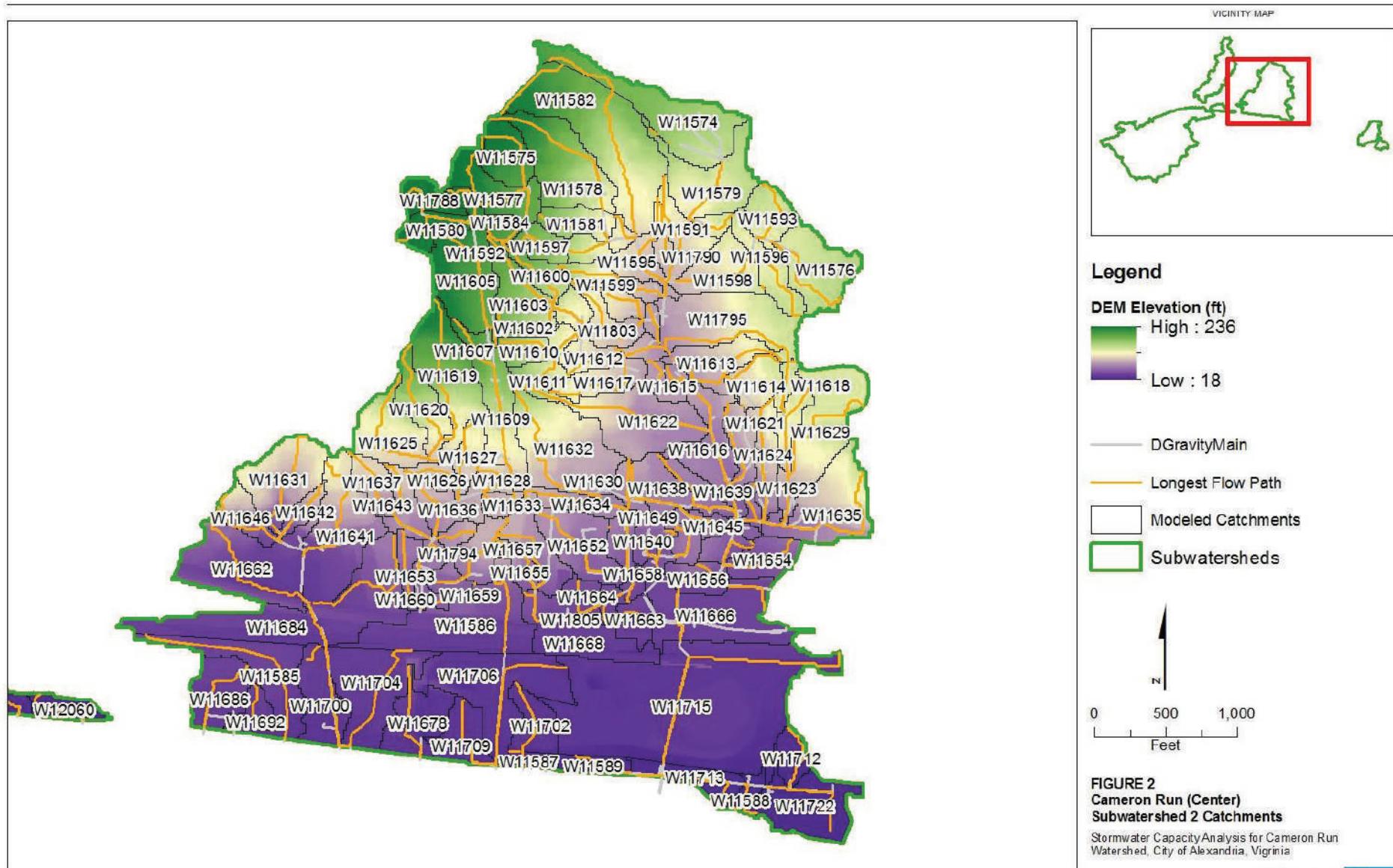


FIGURE 2
Cameron Run (Center)
Subwatershed 2 Catchments

Stormwater Capacity Analysis for Cameron Run Watershed, City of Alexandria, Virginia

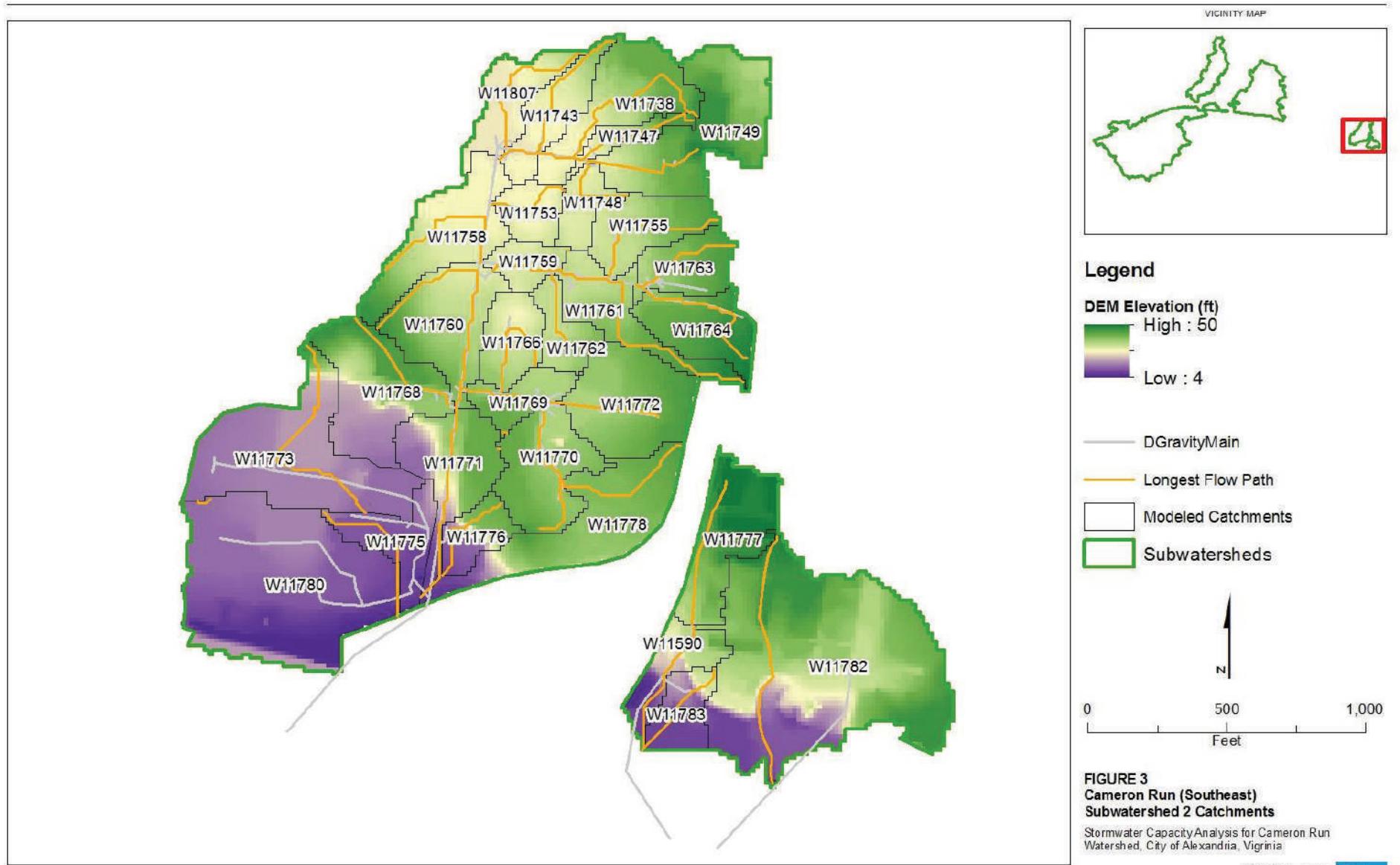


FIGURE 3
Cameron Run (Southeast)
Subwatershed 2 Catchments

Stormwater Capacity Analysis for Cameron Run Watershed, City of Alexandria, Virginia

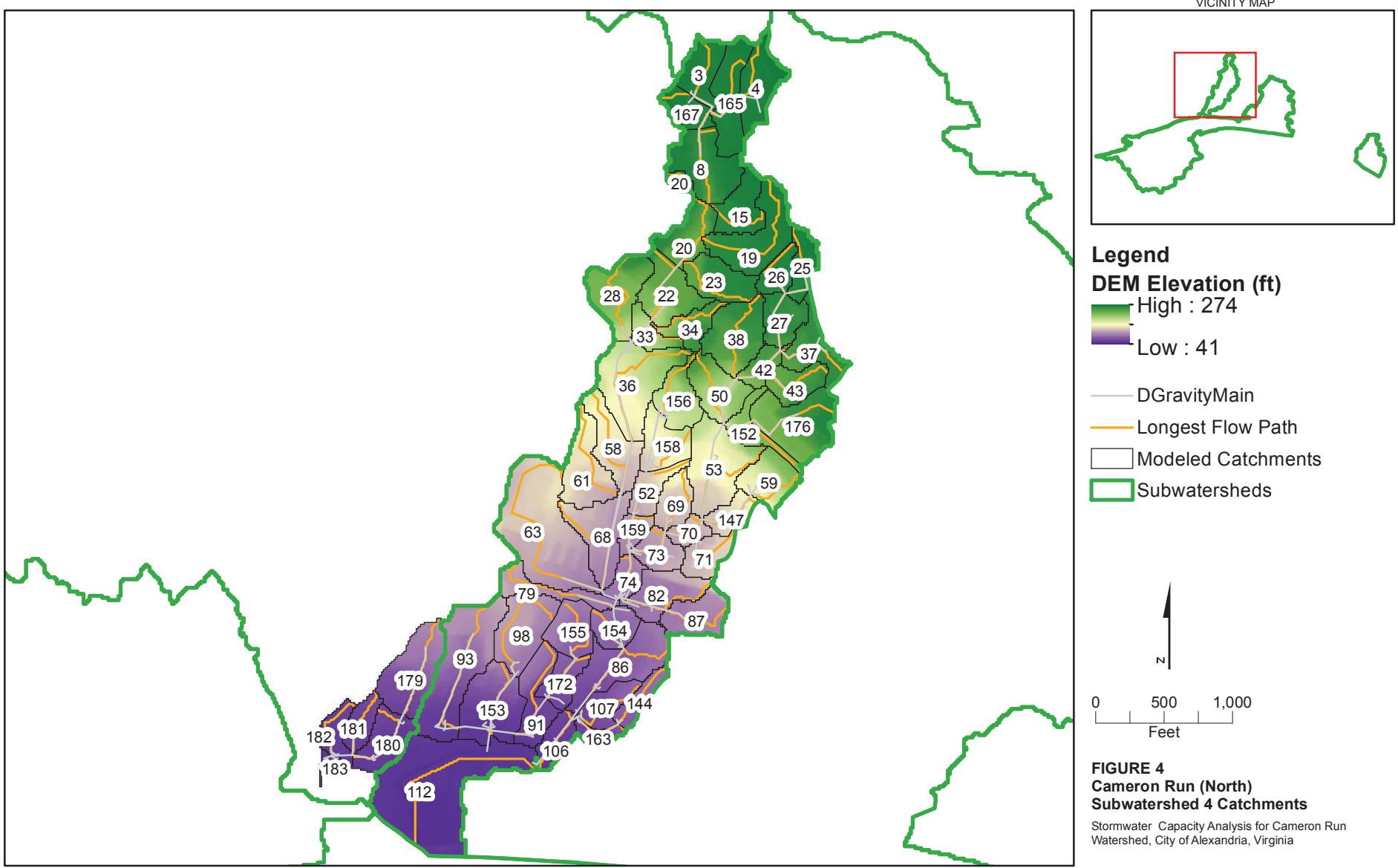


TABLE 1

Infiltration Data

Parameter	Value
Average Capillary Suction (in)	8.27
Initial Moisture Deficit	0.154
Saturated Hydraulic Conductivity (in/hr)	0.2

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
1	W11665	3.466	2.425	368.9	93.19	003604IN
1	W11667	5.641	11.961	169.1	42.82	003654IN
1	W11669	3.559	5.332	291.2	12.43	003716IN
1	W11670	0.661	2.756	131.9	83.34	003696IN
1	W11671	2.500	4.782	172.2	19.33	003697IN
1	W11673	2.817	17.569	242.0	15.25	003642IN
1	W11674	2.794	9.396	216.2	5.23	003653IN
1	W11675	221.927	10.447	1224.9	33.94	003434IN
1	W11676	3.972	4.100	199.7	57.93	003713IN
1	W11677	1.446	4.694	179.9	81.64	003698IN
1	W11679	1.276	4.916	127.5	40.62	003648IN
1	W11680	3.399	1.692	195.6	95.01	003612IN
1	W11681	2.071	1.889	133.3	93.65	003617IN
1	W11682	2.159	1.733	141.3	88.56	003603IN
1	W11683	4.344	2.436	329.7	90.37	003674IN
1	W11685	3.306	14.273	152.7	37.71	003614IN
1	W11687	1.978	3.186	143.5	90.61	003675IN
1	W11688	0.821	1.168	117.2	91.46	003640IN
1	W11689	1.142	3.041	159.0	90.17	003620IN
1	W11690	11.249	7.138	246.4	1.57	000455ND [¶]
1	W11691	1.190	4.761	222.4	41.72	003685IN
1	W11694	5.016	8.768	281.3	24.15	003641IN
1	W11695	0.575	2.858	139.1	83.20	003684IN
1	W11696	1.844	4.881	124.1	23.47	003650IN
1	W11697	0.692	1.523	85.7	93.98	003635IN
1	W11698	0.894	2.223	96.1	94.71	003632IN
1	W11699	0.780	3.371	145.3	65.25	003631IN
1	W11701	1.001	3.177	77.5	96.06	003537IN
1	W11703	5.248	4.072	208.5	84.33	001188SMH [¶]
1	W11705	1.689	2.193	104.6	72.67	003628IN
1	W11707	3.749	6.995	207.8	92.17	003511IN
1	W11708	2.128	2.324	141.3	89.26	003546IN
1	W11710	0.976	2.957	141.1	85.53	003667IN
1	W11711	0.940	3.724	99.3	57.47	003669IN

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
1	W11714	3.173	7.249	119.0	83.71	003500IN
1	W11716	8.946	7.124	302.1	68.58	001148SMH
1	W11717	2.717	2.311	139.6	89.80	003660IN
1	W11718	1.544	2.163	136.1	98.07	003656IN
1	W11719	3.979	9.860	196.2	78.01	003499IN
1	W11720	1.498	8.136	156.0	80.53	003549IN
1	W11721	0.744	7.922	72.5	70.08	003547IN
1	W11724	3.642	7.280	183.0	74.47	001146SMH
1	W11725	0.896	4.447	88.0	66.59	003514IN
1	W11726	4.902	2.925	197.7	87.18	003516IN
1	W11728	6.939	5.126	348.2	67.17	003413IN
1	W11729	3.357	4.293	160.8	75.90	001161SMH
1	W11730	2.960	7.334	172.6	50.65	003657IN
1	W11731	63.166	10.431	560.3	33.41	003659IN
1	W11732	2.918	11.591	199.9	68.11	003486IN
1	W11739	109.395	10.929	713.9	47.17	003530IN
1	W11740	3.466	4.637	163.0	92.15	003578IN
1	W11741	4.669	4.148	292.2	94.57	003567IN
1	W11742	3.658	8.637	273.5	71.44	003123IN
1	W11744	4.567	5.524	248.0	50.24	000365ND
1	W11745	1.751	5.482	158.0	84.91	003596IN
1	W11746	3.945	3.562	294.3	82.56	003601IN
1	W11751	0.895	5.839	96.9	82.34	003399IN
1	W11752	0.854	7.310	132.4	37.82	003401IN
1	W11754	1.283	7.322	111.0	97.80	003395IN
1	W11756	2.457	4.111	131.5	85.09	003391IN
1	W11757	1.358	5.762	148.3	72.64	003594IN
1	W11765	5.578	9.321	328.8	73.76	003589IN
1	W11767	3.241	8.453	167.6	54.31	003406IN
1	W11784	1.317	7.276	173.2	96.29	003394IN
1	W11785	1.741	5.711	145.8	84.66	000449ND
1	W11786	0.642	5.464	135.6	75.68	003508IN
1	W11793	6.498	10.994	269.2	35.01	003626IN
1	W11796	0.646	2.228	230.1	78.82	003681IN
1	W11797	0.416	10.075	144.5	68.47	003647IN
1	W11798	8.093	10.437	318.8	21.29	003118IN
1	W11799	247.346	2.322	1786.8	37.67	Node5154
1	W11800	2.191	2.535	158.4	97.87	003534IN
1	W11801	2.598	5.152	199.2	86.97	003494IN
1	W11802	1.518	3.036	181.8	82.66	001166SMH
1	W11806	0.622	5.268	77.6	90.73	003602IN
1	W11808	3.060	8.285	256.3	69.88	003387IN
1	W12060	1.700	7.281	157.6	41.19	003687IN

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
2	W11574	7.741	4.964	599.2	37.73	001246IN
2	W11575	3.075	8.658	239.0	22.80	001225IN
2	W11576	5.208	3.813	268.9	40.05	001148IN
2	W11577	3.878	7.168	139.0	41.53	001213IN
2	W11578	6.935	13.277	254.1	32.66	001204IN
2	W11579	5.767	8.786	446.0	18.84	001191IN
2	W11580	2.073	4.028	133.4	27.33	001268IN
2	W11581	2.287	13.469	182.1	22.32	001199IN
2	W11582	12.453	10.464	315.5	17.13	001250IN
2	W11583	0.837	10.955	99.1	31.74	001150IN
2	W11584	0.868	6.588	94.3	40.09	001269IN
2	W11585	6.193	3.799	178.7	54.54	003724IN
2	W11586	9.783	7.865	706.0	24.63	NODE5171
2	W11587	0.845	2.158	200.6	82.19	003807IN
2	W11588	1.006	0.798	142.0	74.53	001212SMH
2	W11589	1.396	2.430	134.9	76.29	003806IN
2	W11591	1.930	8.969	142.1	23.99	001155IN
2	W11592	0.857	9.196	118.8	44.73	001218IN
2	W11593	2.562	5.115	200.9	25.61	000046CB
2	W11594	0.697	10.048	117.7	44.51	001194IN
2	W11595	2.459	8.478	123.9	23.77	001251IN
2	W11596	2.847	5.740	187.2	31.74	001146IN
2	W11597	1.774	11.652	148.4	39.50	001212IN
2	W11598	3.853	8.570	260.1	38.58	000050CB
2	W11599	2.056	11.095	110.1	19.30	001164IN
2	W11600	1.705	10.949	120.2	21.65	001253IN
2	W11601	1.317	10.881	99.9	46.42	001187IN
2	W11602	1.839	12.089	126.8	29.50	001255IN
2	W11603	3.626	10.946	144.0	29.79	002347IN
2	W11604	0.568	8.941	82.1	38.50	001185IN
2	W11605	6.343	9.424	267.1	28.80	000500SMH
2	W11606	1.064	11.202	186.3	35.48	002355IN
2	W11607	0.909	11.016	99.3	26.19	002491IN
2	W11608	0.914	9.023	105.3	25.13	002354IN
2	W11609	4.669	11.087	206.0	48.43	000840SMH
2	W11610	1.457	13.987	146.6	10.53	002359IN
2	W11611	1.534	12.472	131.6	27.56	002361IN
2	W11612	1.617	9.329	155.8	30.72	002350IN
2	W11613	3.745	9.443	162.3	50.13	002418IN
2	W11614	2.371	12.019	213.6	37.27	002415IN
2	W11615	1.127	3.842	188.3	60.18	002427IN
2	W11616	5.057	6.634	195.4	76.51	000836SMH
2	W11617	2.645	9.443	139.3	49.89	002351IN

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
2	W11618	0.868	4.573	92.6	41.27	002323IN
2	W11619	6.513	13.431	251.4	17.16	002530IN
2	W11620	3.306	12.415	131.1	44.38	002536IN
2	W11621	1.911	5.910	118.0	35.70	002329IN
2	W11622	7.277	8.232	238.5	64.27	002422IN
2	W11623	1.320	14.054	112.4	40.16	002388IN
2	W11624	2.231	12.074	136.9	43.70	002382IN
2	W11625	4.427	12.508	189.5	35.10	002336IN
2	W11626	1.064	5.781	115.4	80.72	002527IN
2	W11627	1.891	8.228	131.5	65.64	002523IN
2	W11628	1.012	9.026	87.5	65.27	002365IN
2	W11629	7.597	7.388	242.9	50.93	002376IN
2	W11630	1.086	4.943	130.1	88.85	002470IN
2	W11631	5.665	13.858	295.0	34.78	001849IN
2	W11632	8.663	10.666	301.7	49.76	002471IN
2	W11633	0.863	3.278	121.9	0.03	002525IN
2	W11634	1.947	5.156	115.6	94.20	004437IN
2	W11635	6.710	12.800	230.7	59.48	002398IN
2	W11636	2.882	6.933	211.5	59.84	002522IN
2	W11637	2.014	9.454	152.1	54.72	002501IN
2	W11638	2.907	4.729	208.5	84.02	002460IN
2	W11639	1.715	3.839	95.1	81.69	002454IN
2	W11640	1.606	7.226	155.7	92.07	004857IN
2	W11641	8.084	12.498	302.3	72.49	000031CP
2	W11642	1.183	15.307	95.3	63.27	001846IN
2	W11643	2.304	9.324	129.5	56.43	002506IN
2	W11644	0.725	9.395	70.6	53.88	002399IN
2	W11645	1.568	3.823	153.2	90.89	002480IN
2	W11646	1.942	18.263	129.3	39.33	001848IN
2	W11647	1.348	8.378	152.4	78.46	000819SMH
2	W11648	0.821	8.022	119.8	47.53	002508IN
2	W11649	1.529	9.911	136.2	82.41	002443IN
2	W11650	1.152	5.773	111.2	80.93	002339IN
2	W11651	1.318	5.594	131.4	89.02	002437IN
2	W11652	5.083	7.363	210.8	90.43	002450IN
2	W11653	1.410	4.919	109.9	85.87	002519IN
2	W11654	2.649	5.357	194.5	88.78	000309ND
2	W11655	1.493	11.387	122.7	42.90	002453IN
2	W11656	2.009	11.146	188.1	34.05	002485IN
2	W11657	3.022	9.302	198.4	58.41	002452IN
2	W11658	0.692	3.842	123.5	66.02	004459IN
2	W11659	1.276	7.064	177.1	82.31	002516IN
2	W11660	0.687	2.072	138.9	94.33	002521IN

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
2	W11662	9.022	10.373	340.7	57.89	001841IN
2	W11663	1.668	3.344	262.5	22.68	003545SMH
2	W11664	1.092	3.731	124.9	87.36	000848SMH
2	W11666	8.278	2.565	454.2	11.41	003541SMH
2	W11668	6.276	5.209	447.9	29.53	000058CB
2	W11678	4.066	5.958	251.1	52.27	003785IN
2	W11684	12.123	7.686	369.7	23.67	NODE5166
2	W11686	3.920	1.773	265.9	70.75	003717IN
2	W11692	1.622	3.385	167.4	71.92	003727IN
2	W11700	4.133	2.580	216.4	64.76	003721IN
2	W11702	2.590	2.365	201.7	20.62	000479ND
2	W11704	7.199	4.130	309.1	64.29	000470ND
2	W11706	9.389	4.042	367.2	30.49	003808IN
2	W11709	2.987	2.481	203.2	42.07	003809IN
2	W11712	1.637	1.582	141.5	57.60	003795IN
2	W11713	2.779	1.618	135.9	67.22	003805IN
2	W11715	29.985	4.634	659.9	37.89	000480ND
2	W11722	5.843	1.123	341.7	79.91	003800IN
2	W11788	1.826	2.199	238.1	25.77	001258IN
2	W11789	1.186	12.253	123.6	47.49	001209IN
2	W11790	1.552	7.023	110.5	36.79	000049CB
2	W11791	1.319	17.225	131.6	33.48	002379IN
2	W11792	0.676	6.351	105.2	96.39	002444IN
2	W11794	2.479	8.224	199.9	31.68	002513IN
2	W11795	7.626	8.165	294.1	36.68	001181IN
2	W11803	2.330	8.902	122.3	57.26	001186IN
2	W11804	0.474	6.935	93.4	35.48	002419IN
2	W11805	0.866	3.773	110.6	79.78	000849SMH
3	W11590	1.436	8.371	119.3	73.79	000221IN
3	W11738	2.800	3.130	141.2	54.23	000160IN
3	W11743	1.662	2.244	103.0	37.87	000174IN
3	W11747	0.692	4.110	60.9	43.63	000060SMH
3	W11748	0.956	1.374	139.9	46.76	000006CB
3	W11749	4.091	4.099	396.2	60.54	000156IN
3	W11753	1.023	1.782	138.3	35.48	000178IN
3	W11755	1.963	2.503	147.3	38.77	000090SMH
3	W11758	3.035	2.113	208.0	16.27	000177IN
3	W11759	0.852	1.151	136.6	40.61	000181IN
3	W11760	3.001	3.365	133.8	19.69	000185IN
3	W11761	2.113	2.357	96.2	46.14	000012CB
3	W11762	1.090	2.028	124.8	44.02	000011CB
3	W11763	1.539	3.127	158.8	52.60	000015CB
3	W11764	2.054	1.908	142.2	45.05	000092SMH

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
3	W11766	1.472	3.328	148.0	26.19	000191IN
3	W11768	3.555	7.025	313.2	45.53	000186IN
3	W11769	1.136	2.862	148.9	43.62	000009CB
3	W11770	2.763	2.954	204.7	60.82	000198IN
3	W11771	2.762	8.047	172.0	32.28	000076SMH
3	W11772	3.397	1.450	239.4	39.32	000079SMH
3	W11773	5.589	1.979	266.4	41.51	004519IN
3	W11775	1.655	3.984	188.3	17.49	004530IN
3	W11776	1.116	9.942	121.2	28.94	000189IN
3	W11777	2.808	5.957	226.2	46.12	000065IN
3	W11778	3.993	4.505	299.6	16.00	009284IN
3	W11780	8.582	4.160	1468.1	36.02	004513IN
3	W11782	11.725	4.154	402.2	45.38	000053ND
3	W11783	1.255	6.307	137.9	74.51	000222IN
3	W11807	1.650	1.721	122.1	37.91	000167IN
4	179	4.793	7.304	256.2	44.93	000702SMH
4	180	2.939	3.542	177.3	52.17	000705SMH
4	181	1.627	4.129	134.0	46.47	000719SMH
4	182	1.550	2.779	125.4	49.23	000708SMH
4	183	0.532	3.630	131.2	35.76	000055CB
4	91	3.258	8.159	164.6	34.48	000686SMH
4	93	7.643	7.787	272.8	29.65	000699SMH
4	98	4.203	6.608	198.7	38.88	002061IN
4	153	5.066	8.054	367.1	36.60	000690SMH
4	155	2.638	6.178	199.3	52.64	002057IN
4	172	1.918	5.049	169.6	44.50	000687SMH
4	74	1.440	3.706	154.6	76.77	000456SMH
4	79	2.252	4.325	101.4	67.43	001886IN
4	82	3.285	10.031	165.1	66.50	000641SMH
4	86	5.009	5.144	194.6	39.06	000638SMH
4	87	2.820	6.063	190.1	72.34	001897IN
4	106	1.746	3.175	134.9	48.64	000677SMH
4	107	2.035	7.459	132.7	38.99	000674SMH
4	144	1.421	5.571	109.8	56.13	000633SMH
4	154	2.028	5.090	226.1	61.75	001883IN
4	163	0.800	7.521	82.1	52.53	000632SMH
4	25	1.776	2.370	119.7	44.50	002883IN
4	26	1.498	1.629	126.2	12.29	000347ND
4	27	2.341	7.088	232.2	22.15	001383IN
4	37	2.732	5.610	192.1	47.94	000428SMH
4	38	4.277	10.322	240.6	58.29	001504IN
4	42	1.317	15.072	115.6	8.30	001380IN
4	43	2.240	11.076	161.7	33.94	001378IN

TABLE 2

Hydrologic Parameters for Cameron Run Catchments

Subwatershed	HydroID	Area (ac)	Basin Slope (%)	Width	Percent Impervious	Model Load Point
4	50	3.254	18.916	223.4	9.80	001505IN
4	52	1.833	10.161	126.1	45.96	000450SMH
4	53	5.487	13.113	239.3	31.10	000436SMH
4	59	2.880	17.336	281.9	29.34	000435SMH
4	69	2.045	9.514	152.5	38.34	000446SMH
4	70	1.080	5.457	103.1	40.75	009267IN
4	71	2.043	6.349	174.7	47.33	000455SMH
4	73	1.968	7.064	181.1	45.23	000443SMH
4	147	1.649	8.643	121.3	38.86	000459SMH
4	152	1.795	11.159	123.1	36.01	001375IN
4	156	2.698	15.010	221.9	33.25	000437SMH
4	158	2.797	12.708	260.5	43.51	000440SMH
4	159	1.100	7.234	111.9	51.29	000452SMH
4	176	5.175	10.668	292.3	32.63	001377IN
4	3	2.584	2.779	165.0	44.03	000879SMH
4	4	3.336	2.476	281.3	32.97	002843IN
4	8	4.436	9.198	290.1	21.79	000178IO
4	15	2.737	3.023	233.4	1.30	CRND_02
4	19	4.892	2.791	186.2	3.26	CRND_03
4	20	3.281	17.749	145.0	12.70	000227ND
4	22	3.636	12.632	237.6	8.46	000470SMH
4	23	3.006	8.060	169.6	21.80	000227ND
4	28	4.055	10.645	191.1	44.91	000224ND
4	33	1.451	14.035	143.2	25.28	000461SMH
4	34	1.839	13.258	115.2	57.47	000461SMH
4	36	6.224	11.573	230.2	16.48	000463SMH
4	58	3.559	9.000	159.1	13.51	001494IN
4	61	3.949	8.376	200.3	50.44	001501IN
4	63	10.178	7.073	255.6	62.75	002313IN
4	68	4.184	7.676	198.4	52.24	001497IN
4	165	3.672	1.892	262.4	25.76	000880SMH
4	167	1.803	3.008	200.3	40.75	002830IN

Note: HydroID is a unique identifier created by ArcHydro

Attachment C
Inlet Capacity Results

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff (cfs)	Inlet Capacity
1	000365ND	4.567	2	6.5	20.3	Insufficient
1	000449ND	1.741	0	0.0	10.1	Insufficient
1	000455ND	11.249	0	0.0	13.1	Insufficient
1	001146SMH	3.642	0	0.0	19.9	Insufficient
1	001148SMH	8.946	1	3.3	45.9	Insufficient
1	001161SMH	3.357	2	6.5	18.1	Insufficient
1	001166SMH	1.518	5	16.3	8.8	
1	001188SMH	5.248	1	3.3	29.3	Insufficient
1	003118IN	8.093	2	6.5	24.2	Insufficient
1	003123IN	3.658	5	16.3	20.3	Insufficient
1	003387IN	3.060	3	9.8	17.0	Insufficient
1	003391IN	2.457	5	16.3	14.0	
1	003394IN	1.317	2	6.5	7.8	Insufficient
1	003395IN	1.283	1	3.3	7.6	Insufficient
1	003399IN	0.895	2	6.5	5.2	
1	003401IN	0.854	1	3.3	4.3	Insufficient
1	003406IN	3.241	2	6.5	15.4	Insufficient
1	003413IN	6.939	2	6.5	35.5	Insufficient
1	003434IN	221.927	1	3.3	495.7	Insufficient
1	003486IN	2.918	0	0.0	16.0	Insufficient
1	003494IN	2.598	1	3.3	15.1	Insufficient
1	003499IN	3.979	1	3.3	22.4	Insufficient
1	003500IN	3.173	1	3.3	17.9	Insufficient
1	003508IN	0.642	2	6.5	3.7	
1	003511IN	3.749	1	3.3	22.0	Insufficient
1	003514IN	0.896	0	0.0	4.8	Insufficient
1	003515IN	4.902	0	0.0	27.9	Insufficient
1	003530IN	109.395	1	3.3	327.3	Insufficient
1	003534IN	2.191	1	3.3	12.9	Insufficient
1	003537IN	1.001	2	6.5	5.9	
1	003546IN	2.128	1	3.3	12.3	Insufficient
1	003547IN	0.744	1	3.3	4.2	Insufficient
1	003549IN	1.498	1	3.3	8.6	Insufficient
1	003567IN	4.669	2	6.5	27.5	Insufficient
1	003578IN	3.466	2	6.5	20.2	Insufficient
1	003589IN	5.578	1	3.3	31.0	Insufficient
1	003594IN	1.358	2	6.5	7.6	Insufficient
1	003596IN	1.751	2	6.5	10.2	Insufficient
1	003601IN	3.945	3	9.8	22.5	Insufficient
1	003602IN	0.622	2	6.5	3.7	
1	003603IN	2.159	1	3.3	12.4	Insufficient
1	003604IN	3.466	1	3.3	20.4	Insufficient
1	003612IN	3.399	2	6.5	19.6	Insufficient
1	003614IN	3.306	3	9.8	13.8	Insufficient
1	003617IN	2.071	1	3.3	12.0	Insufficient
1	003620IN	1.142	1	3.3	6.7	Insufficient
1	003626IN	6.498	1	3.3	24.6	Insufficient
1	003628IN	1.689	1	3.3	8.8	Insufficient
1	003631IN	0.780	2	6.5	4.3	
1	003632IN	0.894	2	6.5	5.3	
1	003635IN	0.692	1	3.3	4.1	Insufficient
1	003640IN	0.821	1	3.3	4.8	Insufficient
1	003641IN	5.016	1	3.3	17.4	Insufficient

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff (cfs)	Inlet Capacity
1	003642IN	2.817	1	3.3	11.7	Insufficient
1	003647IN	0.416	1	3.3	2.4	
1	003648IN	1.276	4	13.0	5.8	
1	003650IN	1.844	1	3.3	6.1	Insufficient
1	003653IN	2.794	1	3.3	8.7	Insufficient
1	003654IN	5.641	2	6.5	22.0	Insufficient
1	003656IN	1.544	1	3.3	9.1	Insufficient
1	003657IN	2.960	1	3.3	13.7	Insufficient
1	003659IN	63.166	1	3.3	154.7	Insufficient
1	003660IN	2.717	1	3.3	15.5	Insufficient
1	003667IN	0.976	1	3.3	5.7	Insufficient
1	003669IN	0.940	1	3.3	4.8	Insufficient
1	003674IN	4.344	1	3.3	25.3	Insufficient
1	003675IN	1.978	1	3.3	11.6	Insufficient
1	003681IN	0.646	1	3.3	3.7	Insufficient
1	003684IN	0.575	1	3.3	3.3	Insufficient
1	003685IN	1.190	1	3.3	6.1	Insufficient
1	003687IN	1.700	1	3.3	6.7	Insufficient
1	003696IN	0.661	0	0.0	3.8	Insufficient
1	003697IN	2.500	1	3.3	7.8	Insufficient
1	003698IN	1.446	1	3.3	8.4	Insufficient
1	003713IN	3.972	3	9.8	18.4	Insufficient
1	003716IN	3.559	1	3.3	11.0	Insufficient
1	Node5154	247.346	3	9.8	530.4	Insufficient
2	000031CP	8.084	0	0.0	43.4	Insufficient
2	000046CB	2.562	2	6.5	9.3	Insufficient
2	000049CB	1.552	2	6.5	6.5	Insufficient
2	000050CB	3.853	7	22.8	16.7	
2	000058CB	6.276	1	3.3	23.2	Insufficient
2	000309ND	2.649	0	0.0	15.5	Insufficient
2	000470ND	7.199	1	3.3	34.8	Insufficient
2	000479ND	2.590	0	0.0	7.5	Insufficient
2	000480ND	29.985	0	0.0	90.1	Insufficient
2	000500SMH	6.343	4	13.0	21.6	Insufficient
2	000819SMH	1.348	0	0.0	7.8	Insufficient
2	000836SMH	5.057	4	13.0	27.4	Insufficient
2	000840SMH	4.669	0	0.0	20.9	Insufficient
2	000848SMH	1.092	0	0.0	6.4	Insufficient
2	000849SMH	0.866	0	0.0	5.0	Insufficient
2	001146IN	2.847	1	3.3	10.7	Insufficient
2	001148IN	5.208	1	3.3	19.4	Insufficient
2	001150IN	0.837	1	3.3	4.0	Insufficient
2	001155IN	1.930	1	3.3	7.4	Insufficient
2	001164IN	2.056	1	3.3	6.8	Insufficient
2	001181IN	7.626	1	3.3	27.8	Insufficient
2	001185IN	0.568	2	6.5	2.9	
2	001186IN	2.330	1	3.3	11.4	Insufficient
2	001187IN	1.317	1	3.3	6.4	Insufficient
2	001191IN	5.767	4	13.0	21.1	Insufficient
2	001194IN	0.697	3	9.8	3.7	
2	001199IN	2.287	1	3.3	9.5	Insufficient
2	001204IN	6.935	6	19.5	25.2	Insufficient
2	001209IN	1.186	2	6.5	6.1	

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff (cfs)	Inlet Capacity
2	001212IN	1.774	4	13.0	8.4	
2	001212SMH	1.006	0	0.0	5.5	Insufficient
2	001213IN	3.878	3	9.8	14.6	Insufficient
2	001218IN	0.857	1	3.3	4.5	Insufficient
2	001225IN	3.075	4	13.0	11.8	
2	001246IN	7.741	2	6.5	32.1	Insufficient
2	001250IN	12.453	1	3.3	28.4	Insufficient
2	001251IN	2.459	2	6.5	8.1	Insufficient
2	001253IN	1.705	1	3.3	6.5	Insufficient
2	001255IN	1.839	1	3.3	7.7	Insufficient
2	001258IN	1.826	1	3.3	6.8	Insufficient
2	001268IN	2.073	2	6.5	6.9	Insufficient
2	001269IN	0.868	2	6.5	4.1	
2	001841IN	9.022	1	3.3	43.0	Insufficient
2	001846IN	1.183	1	3.3	6.5	Insufficient
2	001848IN	1.942	1	3.3	9.2	Insufficient
2	001849IN	5.665	1	3.3	23.5	Insufficient
2	002323IN	0.868	1	3.3	4.0	Insufficient
2	002329IN	1.911	1	3.3	7.5	Insufficient
2	002336IN	4.427	1	3.3	17.2	Insufficient
2	002339IN	1.152	2	6.5	6.6	Insufficient
2	002347IN	3.626	4	13.0	12.6	
2	002350IN	1.617	2	6.5	7.2	Insufficient
2	002351IN	2.645	2	6.5	12.2	Insufficient
2	002354IN	0.914	1	3.3	4.1	Insufficient
2	002355IN	1.064	5	16.3	5.6	
2	002359IN	1.457	1	3.3	5.9	Insufficient
2	002361IN	1.534	1	3.3	6.7	Insufficient
2	002365IN	1.012	1	3.3	5.5	Insufficient
2	002376IN	7.597	2	6.5	31.7	Insufficient
2	002379IN	1.319	1	3.3	6.5	Insufficient
2	002382IN	2.231	6	19.5	10.3	
2	002388IN	1.320	3	9.8	6.4	
2	002398IN	6.710	1	3.3	32.5	Insufficient
2	002399IN	0.725	1	3.3	3.8	Insufficient
2	002415IN	2.371	1	3.3	11.3	Insufficient
2	002418IN	3.745	5	16.3	16.8	Insufficient
2	002419IN	0.474	1	3.3	2.4	
2	002422IN	7.277	1	3.3	35.5	Insufficient
2	002427IN	1.127	1	3.3	6.1	Insufficient
2	002437IN	1.318	3	9.8	7.7	
2	002443IN	1.529	5	16.3	8.9	
2	002444IN	0.676	4	13.0	4.0	
2	002450IN	5.083	2	6.5	29.6	Insufficient
2	002452IN	3.022	1	3.3	15.5	Insufficient
2	002453IN	1.493	1	3.3	7.2	Insufficient
2	002454IN	1.715	6	19.5	9.6	
2	002460IN	2.907	5	16.3	16.7	Insufficient
2	002470IN	1.086	2	6.5	6.4	
2	002471IN	8.663	2	6.5	37.5	Insufficient
2	002480IN	1.568	1	3.3	9.2	Insufficient
2	002485IN	2.009	3	9.8	9.3	
2	002491IN	0.909	1	3.3	4.1	Insufficient

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff (cfs)	Inlet Capacity
2	002501IN	2.014	1	3.3	10.3	Insufficient
2	002506IN	2.304	2	6.5	11.4	Insufficient
2	002508IN	0.821	1	3.3	4.3	Insufficient
2	002513IN	2.479	1	3.3	10.5	Insufficient
2	002516IN	1.276	2	6.5	7.4	Insufficient
2	002519IN	1.410	1	3.3	8.2	Insufficient
2	002521IN	0.687	2	6.5	4.0	
2	002522IN	2.882	1	3.3	14.8	Insufficient
2	002523IN	1.891	2	6.5	10.1	Insufficient
2	002525IN	0.863	1	3.3	2.5	
2	002527IN	1.064	2	6.5	6.1	
2	002530IN	6.513	1	3.3	19.0	Insufficient
2	002536IN	3.306	2	6.5	14.1	Insufficient
2	003541SMH	8.278	2	6.5	16.8	Insufficient
2	003545SMH	1.668	0	0.0	6.9	Insufficient
2	003717IN	3.920	4	13.0	20.1	Insufficient
2	003721IN	4.133	1	3.3	19.9	Insufficient
2	003724IN	6.193	1	3.3	25.0	Insufficient
2	003727IN	1.622	1	3.3	9.0	Insufficient
2	003785IN	4.066	1	3.3	19.0	Insufficient
2	003795IN	1.637	1	3.3	7.6	Insufficient
2	003800IN	5.843	4	13.0	31.0	Insufficient
2	003805IN	2.779	4	13.0	13.2	Insufficient
2	003806IN	1.396	1	3.3	7.8	Insufficient
2	003807IN	0.845	1	3.3	4.9	Insufficient
2	003808IN	9.389	2	6.5	28.0	Insufficient
2	003809IN	2.987	1	3.3	11.6	Insufficient
2	004437IN	1.947	8	26.0	11.5	
2	004459IN	0.692	1	3.3	3.9	Insufficient
2	004857IN	1.606	4	13.0	9.4	
2	Node5166	12.123	0	0.0	32.4	Insufficient
2	Node5171	9.783	0	0.0	36.6	Insufficient
3	000006CB	0.956	1	3.3	4.3	Insufficient
3	000009CB	1.136	1	3.3	5.3	Insufficient
3	000011CB	1.090	1	3.3	4.8	Insufficient
3	000012CB	2.113	1	3.3	7.9	Insufficient
3	000015CB	1.539	1	3.3	7.4	Insufficient
3	000053ND	11.725	0	0.0	45.0	Insufficient
3	000060SMH	0.692	0	0.0	3.1	Insufficient
3	000061SMH	2.800	0	0.0	12.2	Insufficient
3	000065IN	2.808	1	3.3	13.0	Insufficient
3	000066SMH	1.472	1	3.3	5.4	Insufficient
3	000076SMH	2.762	0	0.0	10.9	Insufficient
3	000079SMH	3.397	1	3.3	12.0	Insufficient
3	000090SMH	1.963	1	3.3	7.5	Insufficient
3	000092SMH	2.054	2	6.5	8.1	Insufficient
3	000156IN	4.091	1	3.3	21.2	Insufficient
3	000167IN	1.650	1	3.3	5.9	Insufficient
3	000174IN	1.662	1	3.3	5.9	Insufficient
3	000177IN	3.035	1	3.3	7.4	Insufficient
3	000178IN	1.023	1	3.3	4.2	Insufficient
3	000181IN	0.852	1	3.3	3.6	Insufficient
3	000185IN	3.001	1	3.3	7.3	Insufficient

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff (cfs)	Inlet Capacity
3	000186IN	3.555	1	3.3	17.0	Insufficient
3	000189IN	1.116	1	3.3	5.1	Insufficient
3	000198IN	2.763	1	3.3	13.6	Insufficient
3	000221IN	1.436	7	22.8	8.1	
3	000222IN	1.255	1	3.3	7.1	Insufficient
3	004515IN	8.582	6	19.5	41.3	Insufficient
3	004519IN	5.589	2	6.5	19.3	Insufficient
3	004530IN	1.655	5	16.3	5.9	
3	009284IN	3.993	1	3.3	12.0	Insufficient
4	000055CB	0.532	5	16.3	2.7	
4	000178IO	4.436	1	3.3	15.9	Insufficient
4	000224ND	4.055	0	0.0	17.7	Insufficient
4	000227ND	6.287	0	0.0	20.0	Insufficient
4	000347ND	1.498	2	6.5	3.4	
4	000428SMH	2.732	2	6.5	12.5	Insufficient
4	000435SMH	2.880	7	22.8	13.7	
4	000436SMH	5.487	8	26.0	20.5	
4	000437SMH	2.698	9	29.3	12.5	
4	000440SMH	2.797	7	22.8	14.0	
4	000443SMH	1.968	12	39.0	9.4	
4	000446SMH	2.045	4	13.0	9.2	
4	000450SMH	1.833	6	19.5	8.7	
4	000452SMH	1.100	4	13.0	5.6	
4	000455SMH	2.043	9	29.3	9.7	
4	000456SMH	1.440	5	16.3	8.2	
4	000459SMH	1.649	4	13.0	7.3	
4	000461SMH	3.290	0	0.0	16.1	Insufficient
4	000463SMH	6.224	3	9.8	17.0	Insufficient
4	000470SMH	3.636	1	3.3	11.7	Insufficient
4	000632SMH	0.800	2	6.5	4.1	
4	000633SMH	1.421	4	13.0	7.1	
4	000638SMH	5.009	4	13.0	17.8	Insufficient
4	000641SMH	3.285	6	19.5	17.3	
4	000674SMH	2.035	6	19.5	8.6	
4	000677SMH	1.746	1	3.3	7.8	Insufficient
4	000686SMH	3.258	4	13.0	12.4	
4	000687SMH	1.918	4	13.0	8.8	
4	000690SMH	5.066	5	16.3	21.7	Insufficient
4	000699SMH	7.643	5	16.3	24.2	Insufficient
4	000702SMH	4.793	8	26.0	20.6	
4	000705SMH	2.939	10	32.5	13.1	
4	000708SMH	1.550	6	19.5	6.9	
4	000719SMH	1.627	1	3.3	7.3	Insufficient
4	000879SMH	2.584	8	26.0	10.3	
4	000880SMH	3.672	0	0.0	10.8	Insufficient
4	001375IN	1.795	4	13.0	7.9	
4	001377IN	5.175	5	16.3	20.7	Insufficient
4	001378IN	2.240	3	9.8	9.7	
4	001380IN	1.317	4	13.0	5.0	
4	001383IN	2.341	3	9.8	9.4	
4	001494IN	3.559	4	13.0	9.4	
4	001497IN	4.184	5	16.3	19.1	Insufficient
4	001501IN	3.949	0	0.0	18.1	Insufficient

TABLE 1
Detailed Inlet Capacity Results for Cameron Run

Sub-shed	Model Load Point	Total Drainage Area (ac)	Total Throat Count	Total Inlet Capacity (cfs)	Peak Runoff	
					(cfs)	Inlet Capacity
4	001504IN	4.277	0	0.0	21.6	Insufficient
4	001505IN	3.254	1	3.3	12.0	Insufficient
4	001883IN	2.028	4	13.0	10.9	
4	001886IN	2.252	2	6.5	11.3	Insufficient
4	001897IN	2.820	3	9.8	15.5	Insufficient
4	002057IN	2.638	3	9.8	12.8	Insufficient
4	002061IN	4.203	4	13.0	16.2	Insufficient
4	002313IN	10.178	2	6.5	46.5	Insufficient
4	002830IN	1.803	3	9.8	7.9	
4	002843IN	3.336	3	9.8	12.2	Insufficient
4	002883IN	1.776	3	9.8	7.1	
4	009267IN	1.080	1	3.3	4.9	Insufficient
4	CRND_02	2.737	0	0.0	5.9	Insufficient
4	CRND_03	4.892	0	0.0	6.2	Insufficient

Attachment D
Detailed Model Results

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
1	002838STMP	001178SMH	001179SMH	332	4	81.39	8.12	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002839STMP	003610IN	001180SMH	205	2.5	18.45	6.13	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002842STMP	001179SMH	000233IO	47	4	-81.43	7.78	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002844STMP	003626IN	003624IN	75	2.25	24.59	7.83	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002845STMP	003624IN	003625IN	333	2.25	24.56	9.19	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002846STMP	003625IN	003614IN	378	2.25	24.49	9.67	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002847STMP	001180SMH	003613IN	140	3	17.92	3.52	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	002848STMP	003614IN	003613IN	115	2.5	37.6	8.92	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	003572STMP	003530IN	000224IO	294	2.5	79.19	15.75	3.4	3.3	Flooded	0.6	Flooded	-	3.2	0.0	326565	0	Flooded
1	003999STMP	003635IN	003633IN	79	1.25	4.06	7.33	0	0	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004001STMP	003633IN	003632IN	80	2.5	26.48	7.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004002STMP	001176SMH	001178SMH	92	4	61.42	8.03	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004003STMP	001177SMH	001176SMH	22	3.5	61.35	9.75	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004004STMP	001181SMH	001175SMH	70	3.5	44.55	8.94	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004005STMP	003631IN	001181SMH	14	1.5	4.31	4.62	0	0	-	0.3	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004007STMP	003632IN	001181SMH	71	3	31.63	9.81	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004008STMP	003629IN	001181SMH	118	1.75	8.69	4.74	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004009STMP	003628IN	003629IN	66	1.5	8.67	4.92	0	0	0.0	-	-	-	0.0	0.0	0	0	Surcharged
1	004119STMP	000238IO	001182SMH	248	3	-0.97	-0.27	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004120STMP	003613IN	003654IN	301	3	65.67	11.02	0	0.1	-	0.6	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004121STMP	003654IN	00239IO	237	3.5	86.53	8.94	0.1	0	0.1	-	-	1.1	0.0	0.0	0	0	Surcharged
1	004122STMP	003653IN	001182SMH	50	1.75	8.66	13.33	0	0	-	0.9	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004337STMP	003395IN	001018SMH	64	2.5	7.58	8.34	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004338STMP	000403ND	001018SMH	83	2.5	34.89	13.35	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004339STMP	003394IN	001017SMH	40	1.25	7.76	12.36	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004340STMP	003387IN	003386IN	50	1.5	16.82	9.67	0.1	0	0.4	-	-	-	0.0	0.0	0	0	Surcharged
1	004341STMP	003388IN	003386IN	40	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004342STMP	003386IN	001013SMH	159	1.75	16.68	10.03	0	0.1	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004343STMP	003405IN	003406IN	57	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004345STMP	003404IN	001021SMH	103	3	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004346STMP	001021SMH	001020SMH	87	3	0	0	0	0.2	-	6.9	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004347STMP	003403IN	003402IN	81	5 x 5	419.25	17.88	0.3	0.3	5.1	5.0	-	-	0.0	0.0	0	0	Surcharged
1	004348STMP	003406IN	003402IN	179	1.5	15.37	13.92	0	0.3	-	8.5	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004349STMP	001020SMH	003403IN	47	5 x 5	419.19	18.64	0.2	0.3	4.9	5.1	-	-	0.0	0.0	0	0	Surcharged
1	004383STMP	003681IN	00243IO	45	1.5	3.67	4.55	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004389STMP	003716IN	001191SMH	98	2	10.88	7.71	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004390STMP	003715IN	001191SMH	63	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004738STMP	003617IN	003610IN	108	2	18.68	8.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004739STMP	003620IN	003617IN	20	1	6.69	11.13	0	0	0.3	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004741STMP	003642IN	000460ND	26	1.5	27.97	15.68	0.4	0	1.8	0.1	-	-	0.0	0.0	0	0	Surcharged
1	004743STMP	000455ND	00235IO	177	5.5	13.07	15.37	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004744STMP	003647IN	000234IO	29	1.5	-2.4	2.96	0	0	-	-	-	1.2	0.0	0.0	0	0	Sufficient Capacity
1	004746STMP	003645IN	003648IN	72	1.25	0	0	0.4	-	1.3	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004747STMP	003648IN	000236IO	100	1.5	-11.19	6.36	0.4	0	1.1	-	-	0.6	0.0	0.0	0	0	Surcharged
1	004943STMP	003551IN	003547IN	31	3	40.81	7.86	0.3	0.4	Flooded	Flooded	Flooded	Flooded	0.3	0.3	2490	2647	Flooded
1	004944STMP	001147SMH	003549IN	180	2.5	65.72	13.86	0.2	0.4	2.4	Flooded	1.6	Flooded	0.0	0.3	0	6971	Insufficient Freeboard
1	004946STMP	001146SMH	001147SMH	71	2.5	65.78	14.65	0.1	0.2	2.3	2.4	1.7	1.6	0.0	0.0	0	0	Insufficient Freeboard
1	004950STMP	003534IN	003537IN	99	1.75	12.84	7.07	0	0	-	1.7	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004951STMP	003537IN	000225IO	36	3.5	119.64	12.55	0	0	-	-	-	1.3	0.0	0.0	0	0	Sufficient Capacity
1	004954STMP	003538IN	003537IN	2	1	1.01	1.28	1.2	0	2.4	2.4	-	-	0.0	0.0	0	0	Surcharged
1	004964STMP	000450ND	000231IO	143	3	112.29	15.85	0.1	55.4	0.8	Flooded	-	Flooded	0.0	55.3	0	609715	Surcharged
1	004965STMP	003576IN	000451ND	15	1	-0.65	2.85	0	0	-	1.5	-	-	0.0	0.0	0	0	Sufficient Capacity
1	004966STMP	003577IN	000450ND	17	1.25	-0.25	0.34	0.2	0.1	1.5	2.6	-	-	0.0	0.0	0	0	Surcharged
1	005004STMP	000229IO	000447ND	186	4 x 10	79.18	10.22	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
1	005005STMP	003602IN	003515IN	108	2	19.28	10.69	0	0.1	-	1.7	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005011STMP	003604IN	001178SMH	21	1.25	20.36	16.39	0.3	0	2.6	1.7	-	-	0.0	0.0	0	0	Surcharged	
1	005014STMP	003612IN	003613IN	7	1	11.14	13.59	1.1	0	Flooded	1.4	Flooded	-	0.6	0.0	0	3199	0	Flooded
1	005019STMP	003634IN	003633IN	51	2	22.69	12.02	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005021STMP	003640IN	001177SMH	86	1.25	4.8	5.77	0	0	-	0.9	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005022STMP	003603IN	001177SMH	85	1.5	12.09	6.82	0.2	0	0.7	0.7	-	-	0.0	0.0	0	0	Surcharged	
1	005083STMP	003389IN	004011ND	4	1.25	0.39	0.52	0.1	0	0.7	0.9	1.9	-	0.0	0.0	0	0	Insufficient Freeboard	
1	005084STMP	001014SMH	001025MH	24	2	27.5	8.71	0.2	0.3	1.6	1.5	1.4	1.7	0.0	0.0	0	0	Insufficient Freeboard	
1	005085STMP	001022SMH	001017SMH	205	2	27.49	9.05	0.3	0	1.5	-	1.7	-	0.0	0.0	0	0	Insufficient Freeboard	
1	005086STMP	003398IN	000403ND	26	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005087STMP	000408ND	001020SMH	95	5.5	418.96	37.88	0	0.2	-	4.4	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005088STMP	000410ND	003404IN	29	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005089STMP	000409ND	003404IN	34	3	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005095STMP	003400IN	001019SMH	212	1.25	0	0	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005096STMP	003399IN	001019SMH	59	1.25	5.18	11.33	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005100STMP	000411ND	001014SMH	34	2	16.53	9.46	0	0.2	0.1	1.6	-	1.4	0.0	0.0	0	0	Surcharged	
1	005101STMP	003391IN	001015SMH	25	1.25	12.76	10.3	0.3	0.2	Flooded	1.3	Flooded	0.8	0.2	0.0	590	0	Flooded	
1	005119STMP	003392IN	001015SMH	15	1.25	-1.94	1.57	2	0.2	2.3	1.3	1.8	0.8	0.0	0.0	0	0	Insufficient Freeboard	
1	005120STMP	001016SMH	001014SMH	39	1.5	12.9	7.27	0.2	0.2	1.7	2.1	0.6	1.4	0.0	0.0	0	0	Insufficient Freeboard	
1	005121STMP	001015SMH	001016SMH	20	1.25	12.81	11.24	0.2	0.2	1.3	1.9	0.8	0.6	0.0	0.0	0	0	Insufficient Freeboard	
1	005122STMP	003393IN	001016SMH	15	1.25	0.76	0.61	0.2	0.2	1.5	1.9	0.6	0.6	0.0	0.0	0	0	Insufficient Freeboard	
1	005123STMP	003390IN	001014SMH	28	1	-0.31	1.27	0	0.2	-	2.6	-	1.4	0.0	0.0	0	0	Sufficient Capacity	
1	005124STMP	001018SMH	001019SMH	53	2.5	42.24	10.71	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005125STMP	001036SMH	000413ND	133	5 x 5	473.73	18.88	0.3	0.3	4.0	3.6	-	-	0.0	0.0	0	0	Surcharged	
1	005126STMP	000412ND	001037SMH	23	1.75	-2.23	2.55	0.4	0.3	5.5	7.5	-	-	0.0	0.0	0	0	Surcharged	
1	005128STMP	003413IN	003415IN	261	1.25	15.28	12.2	1	1	Flooded	1.7	Flooded	1.6	1.0	0.0	14233	0	Flooded	
1	005129STMP	001019SMH	001036SMH	88	3	47.24	19	0	0.3	-	6.0	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005130STMP	001037SMH	001036SMH	105	5 x 5	433.67	18.15	0.3	0.3	4.2	4.0	-	-	0.0	0.0	0	0	Surcharged	
1	005131STMP	001038SMH	001037SMH	151	5 x 5	433.6	18.36	0.3	0.3	4.5	4.2	-	-	0.0	0.0	0	0	Surcharged	
1	005132STMP	003402IN	001038SMH	162	5 x 5	430.47	18.17	0.3	0.3	5.0	4.5	-	-	0.0	0.0	0	0	Surcharged	
1	005133STMP	003401IN	001038SMH	72	1.25	4.57	6.8	0.2	0.3	3.8	8.3	-	-	0.0	0.0	0	0	Surcharged	
1	005309STMP	003117IN	003121IN	301	3.5	24.2	6.31	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005310STMP	003118IN	003117IN	23	3.5	24.15	8.36	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005312STMP	003119IN	003118IN	51	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005314STMP	003121IN	003122IN	139	3.5	24.18	8.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005315STMP	003122IN	003123IN	48	3.5	23.86	7.28	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005316STMP	003123IN	001035SMH	58	3.5	43.25	10.03	0	0.5	-	4.2	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005317STMP	003124IN	003123IN	23	1	-1.23	2.44	0.1	0	0.4	2.3	-	-	0.0	0.0	0	0	Surcharged	
1	005318STMP	000365ND	001035SMH	36	4	28.81	9.24	0.1	0.5	0.2	3.7	-	-	0.0	0.0	0	0	Surcharged	
1	005319STMA	000370ND	000369ND	30	5	541.62	33.38	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005319STMB	001035SMH	000370ND	109	5	526.43	27.07	0.5	0	2.7	-	-	-	0.0	0.0	0	0	Surcharged	
1	005320STMP	003126IN	003125IN	40	1.5	-15.32	8.83	1	0	0.7	-	-	-	0.0	0.0	0	0	Surcharged	
1	005322STMP	003599IN	003601IN	11	1.25	0.5	-0.55	0.3	0.1	1.4	1.2	-	-	0.0	0.0	0	0	Surcharged	
1	005330STMP	003434IN	000447ND	70	1.5	46.05	25.32	11.5	0	Flooded	0.7	Flooded	-	11.3	0.0	1016991	0	Flooded	
1	005332STMP	001175SMH	000230IO	380	5.5	123.22	17.3	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005334STMP	003598IN	003597IN	8	1	-0.37	1.99	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005335STMP	003596IN	001169SMH	83	1.5	20.25	11.84	0.4	0	1.4	-	-	-	0.0	0.0	0	0	Surcharged	
1	005336STMP	003588IN	001167SMH	28	1.25	0	0	0	0	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005337STMP	003586IN	003587IN	9	1	-0.51	1.5	0	0	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005338STMP	001168SMH	001167SMH	7	2	20.1	8.82	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005339STMP	001169SMH	003597IN	17	2	20.25	14.49	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005340STMP	003597IN	003587IN	59	2	20.25	11.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005341STMP	003587IN	001168SMH	42	2	20.21	11	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005342STMP	001167SMH	001166SMH	237	2.5	20.5	6.96	0	0.1	-	0.9	-	-	0.0	0.0	0	0	Sufficient Capacity	

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGGravityMainFacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
1	005343STMP	003601IN	001166SMH	95	2	21.83	7.81	0.1	0.1	0.5	1.4	-	-	0.0	0.0	0	0	Surcharged
1	005345STMP	003593IN	003589IN	75	1.5	14.7	8.13	2.9	3	Flooded	Flooded	Flooded	Flooded	0.7	0.8	3830	11375	Flooded
1	005346STMP	001165SMH	001165SMH	241	2.5	48.99	9.97	0.1	0	0.9	-	-	-	0.0	0.0	0	0	Surcharged
1	005347STMP	003600IN	003599IN	13	1	-0.29	-0.37	0.2	0.3	1.3	1.6	-	-	0.0	0.0	0	0	Surcharged
1	005513STMP	003125IN	000370ND	96	1.5	15.41	12.3	0	0	-	2.6	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005514STMP	003415IN	003126IN	57	1.5	15.3	8.61	1	1	1.5	0.7	1.6	-	0.0	0.0	0	0	Insufficient Freeboard
1	005578STMP	003511IN	000223IO	32	2	29.73	10.35	0	0	-	-	-	1.6	0.0	0.0	0	0	Sufficient Capacity
1	005582STMP	003500IN	003499IN	106	1.75	17.87	11.44	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005586STMP	003494IN	003499IN	100	1.75	15.09	11.82	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005587STMP	003499IN	000222IO	44	3	55.27	22.08	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005593STMP	004232SMH	003511IN	9	2	-8.71	2.97	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005594STMP	001145SMH	001145SMH	64	1.75	8.48	8.04	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005595STMP	003508IN	001144SMH	97	1.75	8.49	9.65	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005598STMP	003514IN	003508IN	59	1.75	4.83	9.13	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005599STMP	003515IN	001146SMH	167	2	46.4	16.57	0.1	0.1	1.7	2.8	-	1.7	0.0	0.0	0	0	Surcharged
1	005631STMP	001148SMH	003551IN	87	3	-45.96	6.47	0.4	0.3	2.8	Flooded	0.7	Flooded	0.0	0.3	0	2490	Insufficient Freeboard
1	005634STMP	003547IN	003546IN	71	3	96.78	13.63	0.4	0.4	Flooded	2.7	Flooded	1.1	0.3	0.0	2647	0	Flooded
1	005635STMP	003546IN	003537IN	352	3	102.3	14.33	0.4	0	2.7	0.4	1.1	-	0.0	0.0	0	0	Insufficient Freeboard
1	005637STMP	003549IN	003547IN	26	2.5	75.14	15.21	0.4	0.4	Flooded	Flooded	Flooded	Flooded	0.3	0.3	6971	2647	Flooded
1	005649STMP	003578IN	001161SMH	89	2.5	47.53	13.98	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005650STMP	003572IN	003573IN	9	1	-0.11	0.74	0	0	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005651STMP	003573IN	003578IN	59	2	27.53	14.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005652STMP	003567IN	001157SMH	29	2.5	27.48	13.4	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005654STMP	001157SMH	003573IN	76	2.5	27.52	12.29	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005659STMP	000439ND	001166SMH	34	1.25	-0.77	2.67	0.1	0.1	0.5	2.1	-	-	0.0	0.0	0	0	Surcharged
1	005660STMP	003589IN	000449ND	70	1.75	12.25	5	3	3.1	Flooded	Flooded	Flooded	Flooded	0.8	2.7	11375	173	Flooded
1	005662STMP	003594IN	003589IN	155	1.25	-8.91	-7.01	2.9	3	Flooded	Flooded	Flooded	Flooded	2.9	0.8	37005	11375	Flooded
1	005663STMP	003595IN	003596IN	48	1.25	11.63	9.37	3	0.4	Flooded	1.7	Flooded	-	0.1	0.0	24	0	Flooded
1	005664STMP	000435ND	003596IN	36	1.25	-0.06	0.23	0	0.4	-	1.7	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005666STMP	001165SMH	001161SMH	174	2.5	49.34	10.6	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005672STMP	003650IN	003649IN	194	1.25	5.84	4.72	0.2	0	0.8	0.2	-	-	0.0	0.0	0	0	Surcharged
1	005674STMP	003641IN	003642IN	56	1.25	16.62	13.3	0.4	0.4	Flooded	2.1	Flooded	-	0.1	0.0	108	0	Flooded
1	005675STMP	003644IN	003649IN	52	1.25	0.09	-0.55	0.2	0	0.5	0.2	-	-	0.0	0.0	0	0	Surcharged
1	005676STMP	003649IN	003648IN	208	1.5	5.85	4.25	0	0.4	-	1.1	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005677STMP	000459ND	000237IO	104	6	27.28	11.88	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005678STMP	003659IN	001186SMH	214	3.5	152.18	20.56	0	0.1	-	2.9	-	0.4	0.0	0.0	0	0	Sufficient Capacity
1	005680STMP	003660IN	001187SMH	10	1.25	15.41	12.21	0.6	0.1	5.8	5.0	0.7	-	0.0	0.0	0	0	Insufficient Freeboard
1	005682STMP	001186SMH	003656IN	166	3.5	162.93	17.47	0.1	0.1	2.9	2.8	0.4	-	0.0	0.0	0	0	Insufficient Freeboard
1	005685STMP	003656IN	001187SMH	125	4	169.64	14.48	0.1	0.1	2.3	2.3	-	-	0.0	0.0	0	0	Surcharged
1	005688STMP	001187SMH	003667IN	188	4	181.9	15.59	0.1	0.1	2.3	2.3	-	1.0	0.0	0.0	0	0	Surcharged
1	005689STMP	003667IN	003669IN	98	4	187.18	14.88	0.1	0.1	2.3	1.9	1.0	-	0.0	0.0	0	0	Insufficient Freeboard
1	005690STMP	003657IN	001186SMH	65	2.25	21.88	5.45	0.2	0.1	Flooded	4.1	Flooded	0.4	0.1	0.0	547	0	Flooded
1	005693STMP	001188SMH	003634IN	146	1.5	22.69	12.9	0.4	0	Flooded	-	Flooded	-	0.3	0.0	2119	0	Flooded
1	005695STMP	003669IN	003674IN	61	4	191.97	15.56	0.1	0.1	1.9	1.1	1.9	-	0.0	0.0	0	0	Insufficient Freeboard
1	005696STMP	001189SMH	000242IO	211	4	227.81	18.08	0.2	0	2.1	-	-	-	0.0	0.0	0	0	Surcharged
1	005697STMP	002364ND	001189SMH	121	4	216.52	17.13	0.2	0.2	4.0	2.1	0.2	-	0.0	0.0	0	0	Insufficient Freeboard
1	005698STMP	003675IN	001189SMH	18	2.5	18.7	5.31	0.2	0.2	2.5	3.6	1.1	-	0.0	0.0	0	0	Insufficient Freeboard
1	005702STMP	001191SMH	001190SMH	39	2	10.87	14.51	0	0	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005703STMP	001182SMH	001190SMH	348	3	8.33	1.32	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005704STMP	003685IN	000249IO	25	1.5	6.61	5	43.9	54.9	0.4	Flooded	-	Flooded	0.0	54.8	0	32277	Surcharged
1	005705STMP	003687IN	000250IO	28	1.5	6.74	9.89	0	0	-	-	-	1.1	0.0	0.0	0	0	Sufficient Capacity
1	005710STMP	003696IN	000472ND	20	1.75	3.82	3.57	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
1	005711STMP	003697IN	000464ND	6	1.25	7.75	6.34	0.3	0	0.7	-	-	-	0.0	0.0	0	0	Surcharged
1	005712STMP	003698IN	000465ND	60	1.25	8.33	6.8	0.1	0	0.8	-	-	-	0.0	0.0	0	0	Surcharged

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
1	005713STMP	003713IN	000466ND	27	1.25	18.33	14.69	0.3	0	3.7	-	0.0	-	0.0	0.0	0	0	Insufficient Freeboard	
1	005716STMP	003684IN	000244IO	25	1.5	3.31	3.57	0	0	-	-	-	-	2.0	0.0	0.0	0	Sufficient Capacity	
1	005718STMP	001190SMH	003714IN	140	3	18.52	3.05	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005727STMA	000472ND	000245IO	126	4	52.79	5.79	0	0	-	-	-	-	1.3	0.0	0.0	0	Sufficient Capacity	
1	005727STMB	000464ND	000472ND	145	4	49.44	5.52	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	005727STMC	000465ND	000464ND	17	4	42.22	4.71	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014639STMP	001145SMH	004230SMH	37	2	8.48	12.49	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014640STMP	004230SMH	004231SMH	56	2	8.41	3.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014641STMP	004231SMH	004232SMH	115	2	8.57	4.1	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014700STMP	001017SMH	000403ND	132	2.5	34.9	15.01	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014701STMP	001013SMH	000411ND	67	2	16.61	6.46	0.1	0	0.2	0.1	-	-	0.0	0.0	0	0	Surcharged	
1	014704STMP	000451ND	000450ND	176	3	112.62	19.03	0	0.1	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	014705STMP	001161SMH	000451ND	60	3	113.37	20.06	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	015108STMP	000447ND	001175SMH	91	5.5	123.22	14.4	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	015109STMA	000466ND	000465ND	166	3.5	34.79	4.62	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	015109STMB	003714IN	000466ND	191	3.5	18.86	3.32	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	015115STMP	003674IN	002364ND	101	4	216.44	22.45	0.1	0.2	1.1	4.0	-	0.2	0.0	0.0	0	0	Surcharged	
1	015120STMP	002360ND	003659IN	115	2.5	0	0	0	0	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	015125STMP	002357ND	001179SMH	220	2.5	0	0	0	0	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	CRpipe24	000449ND	003595IN	220	1.25	11.6	9.1	3.1	3	Flooded	Flooded	Flooded	Flooded	2.7	0.1	173	24	Flooded	
1	CRpipe29	Node5156	000408ND	33	5.5	418.75	36.59	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	CRpipe4	000369ND	Node5163	1032	5 x 10	271.1	12.44	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	CRpipe5	000369ND	Node5164	1037	5 x 10	270.53	12.41	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
1	CRpipe6	000413ND	001035SMH	276	5 x 5	473.75	18.88	0.3	0.5	3.6	2.7	-	-	0.0	0.0	0	0	Surcharged	
2	000681STMA	000194ND	000481SMH	15	1.75	17.23	9.27	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000681STMB	000193ND	000194ND	26	1.75	17.23	11.56	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000681STMC	000480SMH	000193ND	11	1.75	17.22	10.72	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000682STMP	000201ND	000480SMH	100	1.75	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000683STMP	001166IN	001165IN	15	1	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000684STMP	001165IN	000193ND	22	1	0	0	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000685STMP	001167IN	000048CB	26	1	0.65	3.1	0	0	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000686STMP	000048CB	000481SMH	13	1.25	1.39	2.28	0	0	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000687STMP	000481SMH	000482SMH	97	1.75	17.23	8.96	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000688STMP	001168IN	001169IN	5	1	0.19	2.07	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000689STMP	001169IN	000194ND	8	1	0.89	3.47	0	0	-	0.3	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000690STMP	000482SMH	000483SMH	195	1.75	17.23	16.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000691STMP	000483SMH	000484SMH	98	1.75	17.25	14.68	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	000694STMP	000049CB	000195ND	31	1.5	6.7	9.09	0.2	0.3	1.0	3.5	-	-	0.0	0.0	0	0	Surcharged	
2	000768STMP	001200IN	001199IN	301	1.25	13.72	11.23	1	1	Flooded	Flooded	Flooded	Flooded	0.9	0.9	1836	4992	Flooded	
2	000769STMP	001205IN	001200IN	60	1.25	13.4	15.45	0.9	1	1.0	Flooded	1.9	Flooded	0.0	0.9	0	1836	Insufficient Freeboard	
2	000770STMP	001201IN	001202IN	13	1	4.92	7.62	0.9	1	2.6	3.4	0.9	0.1	0.0	0.0	0	0	Insufficient Freeboard	
2	000771STMP	001202IN	001200IN	41	1.25	7.06	5.89	1	1	3.2	Flooded	0.1	Flooded	0.0	0.9	0	1836	Insufficient Freeboard	
2	000772STMP	000488SMH	001205IN	123	0.833	0	0	0	0.9	-	1.4	-	1.9	0.0	0.0	0	0	Sufficient Capacity	
2	000774STMP	001204IN	001205IN	17	1	13.81	17.32	1	0.9	Flooded	1.2	Flooded	1.9	0.9	0.0	0.0	9234	0	Flooded
2	000775STMP	001206IN	001205IN	48	1.25	0	0	0	0.9	-	1.0	-	1.9	0.0	0.0	0	0	Sufficient Capacity	
2	000776STMP	000200ND	000479SMH	59	1.75	0	0	0.3	-	1.8	-	1.5	0.0	0.0	0	0	0	Sufficient Capacity	
2	001020STMA	000195ND	000489SMH	30	3	70.95	12.15	0.3	0.3	2.0	3.0	-	1.1	0.0	0.0	0	0	Surcharged	
2	001020STMB	001162IN	000195ND	40	3	64.61	15.73	0.1	0.3	0.6	2.0	-	-	0.0	0.0	0	0	Surcharged	
2	001022STMP	001164IN	000479SMH	5	1	6.71	8.38	0.4	0.3	Flooded	2.6	Flooded	1.5	0.1	0.0	36	0	Flooded	
2	001023STMP	000479SMH	000206ND	49	1.75	6.78	6.39	0.3	0.4	1.8	5.2	1.5	0.9	0.0	0.0	0	0	Insufficient Freeboard	
2	001024STMA	000206ND	000485SMH	137	3.5	178.72	18.47	0.4	0.6	3.4	Flooded	0.9	Flooded	0.0	0.2	0	1581	Insufficient Freeboard	
2	001024STMB	000489SMH	000206ND	99	3.5	172.45	19.52	0.3	0.4	2.5	3.4	1.1	0.9	0.0	0.0	0	0	Insufficient Freeboard	
2	001025STMP	000097IO	000480SMH	31	0.833	0	0	0	0	-	0.4	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	001026STMP	000484SMH	000489SMH	254	1.75	17.26	13.57	0	0.3	-	4.2	-	1.1	0.0	0.0	0	0	Sufficient Capacity	

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
2	001029STMP	000050CB	000489SMH	19	1.25	16.4	13.05	0.4	0.3	4.6	4.7	0.2	1.1	0.0	0.0	0	0	Insufficient Freeboard
2	001038STMP	001146IN	000476SMH	15	1	8.62	10.91	0.6	0.6	Flooded	1.4	Flooded	0.3	0.6	0.0	3638	0	Flooded
2	001039STMP	000476SMH	000480SMH	112	1.25	17.22	14.5	0.6	0	1.1	-	0.3	-	0.0	0.0	0	0	Insufficient Freeboard
2	001040STMP	000046CB	000476SMH	45	1.25	12.51	11.39	0.3	0.6	0.8	1.1	1.2	0.3	0.0	0.0	0	0	Insufficient Freeboard
2	001041STMP	001147IN	000046CB	76	1	5.07	7.61	2.6	0.3	1.0	1.0	0.2	1.2	0.0	0.0	0	0	Insufficient Freeboard
2	001042STMP	000096IO	001147IN	23	0.833	5.07	9.83	2.3	2.6	Flooded	1.2	Flooded	0.2	1.0	0.0	697	0	Flooded
2	001100STMP	001185IN	00003PD	14	2	20.23	6.51	0.7	0.4	3.0	RIM	0.8	RIM	0.0	0.0	0	0	Insufficient Freeboard
2	001101STMP	001187IN	001186IN	61	1.25	6.4	12.21	0	0.2	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001115STMP	001150IN	000202ND	68	1.25	4.02	9.82	0	0	-	0.0	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001118STMP	000477SMH	001155IN	135	3	57.2	18.81	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001119STMA	002020ND	000477SMH	99	3	57.09	19.86	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001119STMB	001191IN	002020ND	32	3	53.1	19.35	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001122STMA	000192ND	001162IN	101	3	64.63	17.86	0	0.1	-	0.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001122STMB	001155IN	000192ND	66	3	64.58	18.99	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001243STMP	002475IN	002476IN	89	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001244STMP	000060CB	002475IN	15	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001245STMP	000061CB	002476IN	13	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001246STMP	004437IN	000303ND	7	1.5	11.37	6.78	0.1	0.1	0.4	0.6	-	-	0.0	0.0	0	0	Surcharged
2	001247STMP	000841SMH	000561ND	77	2	51.65	22.6	0	0.1	-	2.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001248STMP	000561ND	002446IN	229	2	51.44	17.44	0.1	0.1	2.6	0.8	-	-	0.0	0.0	0	0	Surcharged
2	001249STMP	002444IN	00176IO	35	1.5	19.56	13.82	0.1	0.5	1.1	3.0	1.6	2.0	0.0	0.0	0	0	Insufficient Freeboard
2	001250STMP	000836SMH	000844SMH	55	5.5 x 5.5	395.89	18.38	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001263STMP	000819SMH	002435IN	45	4 x 4	123.22	18.55	0	0.5	-	1.5	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001266STMP	000821SMH	000822SMH	119	1.25	7.59	7.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001267STMP	002437IN	000821SMH	20	1.25	-7.59	6.11	0.2	0	0.3	-	-	-	0.0	0.0	0	0	Surcharged
2	001268STMP	002439IN	002437IN	88	1.25	-0.11	0.49	0	0.2	-	0.3	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001372STMP	001196IN	001195IN	139	1.75	38.44	21.28	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity
2	001373STMP	000487SMH	001196IN	72	1.5	38.44	21.73	1	0	3.8	-	1.2	-	0.0	0.0	0	0	Insufficient Freeboard
2	001374STMP	001199IN	000487SMH	35	1.75	28.8	11.84	1	1	Flooded	3.5	Flooded	1.2	0.9	0.0	4992	0	Flooded
2	001375STMP	001209IN	000487SMH	105	1.25	24.79	19.39	0.8	1	Flooded	4.0	Flooded	1.2	0.5	0.0	926	0	Flooded
2	002050STMP	000485SMH	000486SMH	11	3.5	178.72	18.5	0.6	0.5	Flooded	2.0	Flooded	0.4	0.2	0.0	1581	0	Flooded
2	002055STMP	000486SMH	001181IN	26	3.5	178.73	18.53	0.5	0.6	2.0	2.0	0.4	1.3	0.0	0.0	0	0	Insufficient Freeboard
2	002056STMP	001181IN	00003PD	33	3.5	205.8	21.35	0.6	0.4	2.0	RIM	1.3	RIM	0.0	0.0	0	0	Insufficient Freeboard
2	002059STMP	001184IN	001185IN	42	2	17.43	8.95	0.5	0.7	1.8	3.0	-	0.8	0.0	0.0	0	0	Surcharged
2	002060STMP	001186IN	001184IN	80	1.75	17.62	10.3	0.2	0.5	0.3	2.0	-	-	0.0	0.0	0	0	Surcharged
2	002124STMP	001246IN	001248IN	41	3	-32.2	4.75	0.3	0	0.3	-	-	-	0.0	0.0	0	0	Surcharged
2	002125STMP	001247IN	001248IN	11	1.25	-0.05	0.18	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002126STMP	001248IN	001249IN	249	3	32.19	18.78	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002127STMP	001251IN	000489SMH	176	2.5	77.73	15.69	0.4	0.3	Flooded	3.5	Flooded	1.1	0.3	0.0	2390	0	Flooded
2	002129STMP	001253IN	000491SMH	17	1.5	6.49	10.28	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002130STMP	000491SMH	001254IN	104	1.5	6.48	13.41	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002131STMP	001254IN	001256IN	185	1.5	14.11	15.86	0	0.1	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002132STMP	001255IN	001254IN	81	1.25	7.65	12.2	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002133STMP	001256IN	000102IO	38	1.5	14.11	7.76	0.1	0	0.2	-	-	-	0.0	0.0	0	0	Surcharged
2	002134STMP	000492SMH	000496SMH	348	1.5	6.8	8.45	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002135STMP	000493SMH	000492SMH	57	1.5	6.83	5.48	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002131STMP	001249IN	001191IN	219	3	32.13	17.71	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002314STMP	001195IN	001192IN	38	2.5	69.98	18.23	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002316STMP	001194IN	001195IN	6	1	3.72	4.72	0.6	0	0.7	0.9	-	-	0.0	0.0	0	0	Surcharged
2	002317STMP	001250IN	001195IN	123	2	28.34	17.87	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	002318STMP	000207ND	000479SMH	163	1.25	0	0	0	0.3	-	2.3	1.8	1.5	0.0	0.0	0	0	Sufficient Capacity
2	002319STMP	001192IN	001251IN	204	2.5	69.98	19.04	0	0.4	-	Flooded	-	Flooded	0.0	0.3	0	2390	Sufficient Capacity
2	002322STMP	001210IN	001209IN	78	1.25	22.54	17.51	0.8	0.8	Flooded	Flooded	Flooded	Flooded	0.7	0.5	1334	926	Flooded
2	002323STMP	001211IN	001212IN	11	1.25	19.61	15.42	0.8	0.8	Flooded	6.3	Flooded	0.4	0.7	0.0	7049	0	Flooded

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMainFacilityID	Junction Facility ID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
2	002324STMP	001213IN	001215IN	67	1.25	20.49	17.4	0.6	0.6	Flooded	4.8	Flooded	1.4	0.5	0.0	2686	0	Flooded	
2	002325STMP	001218IN	001213IN	30	1.25	5.7	8.75	0.5	0.6	Flooded	Flooded	Flooded	0.3	0.5	418	2686	0	Flooded	
2	002326STMP	001214IN	001215IN	7	1	1.03	2.24	0.6	0.6	4.6	5.1	1.9	1.4	0.0	0.0	0	0	0	Insufficient Freeboard
2	002330STMP	001219IN	001220IN	30	1	4.1	6.39	0.5	0.5	1.7	Flooded	1.3	Flooded	0.0	0.5	0	1023	0	Insufficient Freeboard
2	002331STMP	001223IN	001220IN	40	1.25	8.68	6.94	0.6	0.5	Flooded	Flooded	Flooded	0.5	0.5	1413	1023	0	Flooded	
2	002332STMP	001220IN	001213IN	268	1.25	11.88	9.64	0.5	0.6	Flooded	Flooded	Flooded	0.5	0.5	1023	2686	0	Flooded	
2	002333STMP	001221IN	001222IN	4	1	2.61	3.41	0.5	0.5	3.0	3.4	1.0	0.3	0.0	0.0	0	0	0	Insufficient Freeboard
2	002334STMP	001222IN	001223IN	7	1	3.66	4.61	0.5	0.6	3.4	Flooded	0.3	Flooded	0.0	0.5	0	1413	0	Insufficient Freeboard
2	002335STMP	001225IN	001223IN	178	1.25	11.74	14.34	0	0.6	-	Flooded	-	Flooded	0.0	0.5	0	1413	0	Sufficient Capacity
2	002351STMP	001239IN	001248IN	315	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002368STMP	000494SMH	000493SMH	51	1.5	6.82	10.83	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002370STMP	000495SMH	000494SMH	11	1.5	6.82	9.13	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002371STMP	001258IN	000495SMH	14	1.5	6.81	6.92	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002381STMP	000496SMH	001268IN	18	1.5	6.81	8.52	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002382STMP	001270IN	000496SMH	27	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002383STMP	001268IN	000497SMH	16	1.5	13.55	12.12	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002384STMP	000497SMH	001299IN	208	1.5	17.56	13.73	0	0.1	-	1.9	-	1.6	0.0	0.0	0	0	0	Sufficient Capacity
2	002385STMA	000209ND	000497SMH	14	1.25	4.08	5.08	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002385STMB	001298IN	000209ND	31	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002386STMP	001269IN	000209ND	62	1.25	4.1	10.73	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002418STMP	001299IN	001300IN	237	1.5	17.56	11.43	0.1	0.2	1.9	Flooded	1.6	Flooded	0.0	0.1	0	159	0	Insufficient Freeboard
2	002419STMP	001300IN	001301IN	209	1.5	16.16	10.04	0.2	0.3	Flooded	Flooded	Flooded	0.1	0.2	159	499	0	Flooded	
2	002420STMP	001302IN	001300IN	58	1.25	2.07	3.55	0.2	0.2	Flooded	Flooded	Flooded	0.1	0.1	112	159	0	Flooded	
2	002421STMP	001301IN	000500SMH	12	1.75	17.79	7.32	0.3	0.4	Flooded	3.3	Flooded	0.4	0.2	0.0	499	0	Flooded	
2	002564STMP	002365IN	000840SMH	65	1.25	5.5	11.25	0	0	-	0.5	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002565STMP	004126SMH	000841SMH	49	2	41.03	14.9	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002566STMP	002476IN	002477IN	151	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002568STMP	002525IN	000312ND	34	1	2.55	9.07	0	0	-	0.4	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002570STMP	000869SMH	002350IN	75	2.5	12.23	6.06	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002571STMP	002351IN	000869SMH	42	1.25	12.24	16.25	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002796STMA	000315ND	004458IN	62	2	60.36	20.04	0.2	0.4	3.1	4.4	-	-	0.0	0.0	0	0	0	Surcharged
2	002796STMB	000826SMH	000315ND	49	2	51.53	21.59	0.1	0.2	1.2	3.1	-	-	0.0	0.0	0	0	0	Surcharged
2	002797STMA	000313ND	000819SMH	135	4	200	16.44	0.1	0	0.1	-	-	-	0.0	0.0	0	0	0	Surcharged
2	002797STMB	000844SMH	000313ND	106	4	200.07	17.07	0	0.1	0.0	0.1	-	-	0.0	0.0	0	0	0	Surcharged
2	002812STMP	000827SMH	000828SMH	16	1.25	0.2	-0.51	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	002813STMP	002339IN	000856SMH	109	3.5	171.46	19.82	0.1	0.2	1.5	2.2	-	-	0.0	0.0	0	0	0	Surcharged
2	002879STMP	000857SMH	002522IN	123	3.5	125.1	20.39	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003100STMP	002323IN	000788SMH	23	1.5	3.96	6.57	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003333STMP	001841IN	000619SMH	27	3	76.85	10.76	0.4	0.4	4.7	Flooded	0.1	Flooded	0.0	0.2	0	1068	0	Insufficient Freeboard
2	003344STMP	000618SMH	001841IN	48	3	39.24	5.5	0.3	0.4	4.3	4.7	1.2	0.1	0.0	0.0	0	0	0	Insufficient Freeboard
2	003355STMP	000621SMH	000618SMH	121	3	39.22	7.03	0.3	0.3	3.6	4.3	-	1.2	0.0	0.0	0	0	0	Surcharged
2	003365STMP	000619SMH	000132IO	308	3 x 3.5	67.8	9.72	0.4	0	Flooded	-	Flooded	-	0.2	0.0	1068	0	0	Flooded
2	003339STMP	000031CP	000032CP	159	6	107.97	10.81	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003341STMP	001846IN	000621SMH	50	2.5	29.99	9.86	0.3	0.3	3.0	4.1	-	-	0.0	0.0	0	0	0	Surcharged
2	003346STMP	001849IN	001846IN	42	2	23.47	14.76	0.2	0.3	1.0	3.5	-	-	0.0	0.0	0	0	0	Surcharged
2	003347STMP	001848IN	000621SMH	67	1.5	9.18	11.23	0	0.3	-	5.1	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003550STMP	002480IN	000844SMH	10	1.5	9.03	5.08	0.6	0	1.8	2.5	-	-	0.0	0.0	0	0	0	Surcharged
2	003588STMP	002502IN	002506IN	139	1.5	10.24	12.88	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003598STMP	002516IN	000856SMH	94	1.25	15.79	13.51	0.2	0.2	2.8	4.5	1.9	-	0.0	0.0	0	0	0	Insufficient Freeboard
2	003599STMP	002517IN	002516IN	141	1.25	10.96	8.81	0.2	0.2	Flooded	2.8	Flooded	1.9	0.2	0.0	417	0	0	Flooded
2	003600STMP	002513IN	002517IN	122	1	10.15	12.53	0.2	0.2	5.1	Flooded	-	Flooded	0.0	0.2	0	417	0	Surcharged
2	003621STMP	000799SMH	000801SMH	104	1.5	10.34	14.6	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003622STMP	000801SMH	000802SMH	91	1.75	10.35	14.75	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
2	003623STMP	000802SMH	002388IN	70	1.75	10.35	15.06	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Length (ft)	Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	US					US	DS	US	DS	US	DS	US	DS	US	DS	
2	003625STMP	002388IN	000300ND	82	2	16.62	13.83	0	0.3	-	3.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003627STMP	002392IN	000804SMH	163	1.25	0	0	0	0	-	-	1.8	-	0.0	0.0	0	0	Sufficient Capacity	
2	003628STMP	000804SMH	002391IN	225	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003634STMP	000805SMH	000835SMH	37	2	42.54	17.6	0.2	0.4	3.6	6.9	-	1.9	0.0	0.0	0	0	Surcharged	
2	003635STMP	002399IN	000836SMH	127	5.5	94.52	11.56	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003639STMP	000811SMH	002403IN	235	5	263.29	21.17	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003640STMA	000298ND	000806SMH	16	5	288.21	18.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003640STMB	000293ND	000298ND	14	5	268.55	17.61	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003640STMC	000294ND	000293ND	201	5	267.94	20.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003640STMD	000295ND	000294ND	27	5	263.35	20.17	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003640STME	002403IN	000295ND	57	5	263.32	20.62	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003642STMP	002391IN	002362IN	57	1.25	6.37	14.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003648STMP	002410IN	002411IN	33	2	11.07	10.16	0	0.2	-	0.4	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003649STMP	000810SMH	002410IN	65	1.5	11.26	15.25	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003650STMP	002411IN	002416IN	121	2	10.47	7.75	0.2	0.6	0.4	3.1	-	-	0.0	0.0	0	0	Surcharged	
2	003651STMA	000296ND	002414IN	99	5	242.63	18.95	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003651STMB	002412IN	000296ND	86	5	242.59	19.13	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003652STMA	000297ND	002412IN	278	5	242.57	18.75	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003652STMB	000170IO	000297ND	57	5	241.42	19.31	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003653STMP	002422IN	002414IN	20	2	35.48	17.66	0	0	-	1.2	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003654STMP	002414IN	000811SMH	68	5	263.28	19.92	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003655STMP	002415IN	000810SMH	38	1.25	11.27	16.83	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003657STMP	002416IN	002417IN	34	2	10.42	6.53	0.6	0.7	3.1	3.8	-	-	0.0	0.0	0	0	Surcharged	
2	003658STMP	002417IN	002418IN	149	2	10.38	3.51	0.7	2.5	3.8	6.3	-	-	0.0	0.0	0	0	Surcharged	
2	003659STMP	002418IN	00003PD	103	2	26.58	8.32	2.5	0.4	6.3	RIM	-	RIM	0.0	0.0	0	0	Surcharged	
2	003661STMP	002419IN	000297ND	23	1.25	2.63	3.96	0.7	0	0.9	1.9	-	-	0.0	0.0	0	0	Surcharged	
2	003665STMP	002368IN	002347IN	59	2	13.96	7.41	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003666STMP	002348IN	002349IN	111	2	42.32	14.37	0	0	0.1	-	-	-	0.0	0.0	0	0	Surcharged	
2	003667STMP	002347IN	002348IN	34	2	26.26	10.18	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003668STMP	002349IN	000868SMH	199	2	42.46	21.1	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003669STMP	000854SMH	000855SMH	201	1.5	31.31	21.64	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003675STMP	002362IN	000294ND	109	1.25	6.36	12.38	0	0	-	2.0	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003835STMP	002329IN	000789SMH	28	1.25	7.44	14.09	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003926STMP	000790SMH	000791SMH	112	1.5	11.34	16.69	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003927STMP	000789SMH	000790SMH	156	1.5	11.35	16.63	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003928STMP	000788SMH	000789SMH	311	1.5	3.92	10.15	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003932STMP	000791SMH	000792SMH	23	1.5	11.34	15.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003933STMP	000792SMH	000809SMH	123	1.5	11.37	16.41	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003935STMP	000809SMH	002376IN	26	2	11.37	15.89	0	0.2	-	4.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003940STMP	002376IN	000805SMH	61	2	42.66	13.41	0.2	0.2	4.1	3.6	-	-	0.0	0.0	0	0	Surcharged	
2	003943STMP	002379IN	000795SMH	4	1.25	6.48	7.23	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003944STMP	000795SMH	000795SMH	140	1.5	6.45	11.29	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003947STMP	002382IN	002381IN	41	1.25	10.31	11.16	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003948STMP	002381IN	002383IN	159	1.25	10.3	12.05	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003949STMP	002383IN	002391IN	110	1.25	6.36	10.25	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003950STMP	002383IN	002384IN	65	4.216	3.94	3.05	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003951STMP	002384IN	002386IN	23	3.333	3.93	5.82	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003953STMA	000291ND	000799SMH	12	1.5	6.44	11.12	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003953STMB	000797SMH	000291ND	47	1.5	6.45	13.83	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003954STMP	002386IN	000799SMH	31	0.833	3.93	9.09	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003957STMP	002423IN	002422IN	284	1.75	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003961STMP	002427IN	00003PD	60	2.25	-7.74	4.66	0.9	0.4	3.8	RIM	-	RIM	0.0	0.0	0	0	Surcharged	
2	003965STMP	000868SMH	002350IN	97	2	42.45	20.35	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	003966STMP	002350IN	002354IN	187	3	61.24	14.53	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGGravityMainFacilityID	Junction Facility ID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
2	003967STMP	002354IN	000870SMH	65	3	65.16	15.12	0	0.4	-	1.3	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003968STMP	000870SMH	00003PD	33	3	64.88	13.22	0.4	0.4	1.3	RIM	-	RIM	0.0	0.0	0	0	Surcharged
2	003969STMP	002355IN	002348IN	24	1.5	16.24	13.01	0	0	-	0.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003970STMP	002356IN	002355IN	39	1.25	10.77	15.6	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003971STMP	002357IN	002356IN	98	1.25	10.77	16.55	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003972STMP	002358IN	002357IN	106	1.25	10.76	11.46	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003973STMP	002359IN	002358IN	55	1.25	5.91	11.98	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003974STMP	002360IN	002358IN	40	1.25	-2.7	2.25	55.1	0	Flooded	-	Flooded	-	0.4	0.0	539	0	Flooded
2	003975STMP	002361IN	002358IN	110	1.25	6.71	7.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	003977STMA	000305ND	000058CB	16	1.25	12.88	10.21	1.2	1.2	Flooded	Flooded	Flooded	Flooded	1.1	1.1	41	17359	Flooded
2	003977STMB	002453IN	000305ND	28	1.25	9.18	7.42	1.2	1.2	Flooded	Flooded	Flooded	Flooded	0.9	1.1	6682	41	Flooded
2	003978STMP	000058CB	000834SMH	82	1.25	19.56	15.97	1.2	0	Flooded	-	Flooded	-	1.1	0.0	17359	0	Flooded
2	003979STMP	000500SMH	000851SMH	179	2	35.21	11.1	0.4	0.5	3.1	Flooded	0.4	Flooded	0.0	0.3	0	946	Insufficient Freeboard
2	003980STMP	000853SMH	000854SMH	200	1.5	31.31	21.7	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004149STMP	000822SMH	000823SMH	32	1.25	7.6	10.62	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004150STMP	002440IN	000823SMH	17	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004151STMP	000823SMH	000824SMH	14	1.25	7.6	10.87	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004152STMP	000824SMH	000825SMH	70	1.25	7.6	13.96	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004153STMP	000825SMH	002441IN	8	1.25	7.6	7.95	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004154STMP	002442IN	002444IN	48	1.5	7.58	8.56	0	0.1	-	1.1	-	1.6	0.0	0.0	0	0	Sufficient Capacity
2	004155STMP	002441IN	002442IN	104	1.25	7.6	11.03	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004156STMP	002443IN	002444IN	49	1.5	8.4	8.83	0	0.1	-	1.1	-	1.6	0.0	0.0	0	0	Sufficient Capacity
2	004157STMP	002445IN	002444IN	32	1.25	0.5	2.14	0	0.1	0.2	1.4	1.6	1.6	0.0	0.0	0	0	Insufficient Freeboard
2	004158STMP	002446IN	000826SMH	39	2	51.48	11.46	0.1	0.1	0.8	1.2	-	-	0.0	0.0	0	0	Surcharged
2	004161STMP	002447IN	000827SMH	20	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004162STMP	004439IN	002448IN	14	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004163STMP	002448IN	000828SMH	143	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004164STMP	004438IN	002448IN	42	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004165STMP	000828SMH	002443IN	72	1.5	-0.6	0.54	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004169STMP	002450IN	000173IO	105	1.75	29.31	12.86	0.1	0	1.3	-	1.4	1.2	0.0	0.0	0	0	Insufficient Freeboard
2	004172STMP	002452IN	000305ND	90	2.25	15.42	10.19	0	1.2	-	Flooded	-	Flooded	0.0	1.1	0	41	Sufficient Capacity
2	004173STMP	000834SMH	000175IO	85	2	19.56	14.91	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004174STMP	002398IN	000835SMH	40	2.5	31.91	8.96	0.2	0.4	4.7	6.4	-	1.9	0.0	0.0	0	0	Surcharged
2	004175STMA	000299ND	002399IN	16	2.5	90.92	18.76	0	0	0.9	-	-	-	0.0	0.0	0	0	Surcharged
2	004175STMB	000300ND	00299ND	41	2.5	90.91	18.41	0.3	0	2.6	0.9	-	-	0.0	0.0	0	0	Surcharged
2	004175STMC	000835SMH	000300ND	145	2.5	74.28	14.9	0.4	0.3	6.4	2.6	1.9	-	0.0	0.0	0	0	Insufficient Freeboard
2	004181STMP	000840SMH	000866SMH	73	2	57.51	20.63	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004183STMP	002454IN	000298ND	55	3	26.15	10.01	0	0	-	1.0	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004184STMP	002455IN	002456IN	25	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004185STMP	002456IN	002457IN	33	2.5	16.79	12.49	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004186STMP	002457IN	002454IN	124	2.5	16.76	11.38	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004187STMP	002459IN	002458IN	52	2.5	16.75	10.56	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004188STMP	002458IN	002456IN	64	2.5	16.77	10.5	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004189STMP	002460IN	002459IN	13	2.25	16.72	11.48	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004190STMP	002461IN	002460IN	27	2.25	-0.21	0.85	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004191STMP	002463IN	002461IN	68	2.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004192STMP	002464IN	002463IN	84	2.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004193STMP	002468IN	002464IN	180	2	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004194STMP	002469IN	002468IN	91	2	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004196STMP	002472IN	002472IN	33	1.5	34.84	19.53	0.2	0.2	Flooded	2.1	Flooded	-	0.1	0.0	244	0	Flooded
2	004197STMP	002472IN	002470IN	166	2	34.85	11.04	0.2	0.2	1.6	0.6	-	1.9	0.0	0.0	0	0	Surcharged
2	004201STMP	000847SMH	000846SMH	66	1.25	1.55	4.09	1.5	1.5	2.9	4.4	-	0.8	0.0	0.0	0	0	Surcharged
2	004202STMP	000849SMH	000848SMH	86	3	99.74	7	1.5	54.9	3.4	6.6	0.6	0.9	0.0	0.0	0	0	Insufficient Freeboard
2	004203STMP	000848SMH	000846SMH	141	3	-53.37	7.45	54.9	1.5	6.6	2.7	0.9	0.8	0.0	0.0	0	0	Insufficient Freeboard

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
2	004205STMP	002435IN	002485IN	149	3	122.67	23.47	0.5	1.3	2.5	Flooded	-	Flooded	0.0	1.3	0	238829	Surcharged
2	004207STMP	000346IO	004458IN	279	2.5	29.25	12.74	0	0.4	-	3.9	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004208STMP	002485IN	002486IN	218	3.5	249.3	12.74	1.3	1.3	Flooded	Flooded	Flooded	Flooded	1.3	0.8	238829	3546	Flooded
2	004212STMP	000850SMH	000852SMH	234	1.5	31.31	19.39	0.5	0	Flooded	-	Flooded	-	0.4	0.0	1526	0	Flooded
2	004213STMP	000851SMH	000850SMH	31	2	34.01	14.41	0.5	0.5	Flooded	Flooded	Flooded	Flooded	0.3	0.4	946	1526	Flooded
2	004214STMP	002491IN	000851SMH	13	1.25	-13.02	10.48	0.5	0.5	Flooded	Flooded	Flooded	Flooded	0.4	0.3	2839	946	Flooded
2	004216STMP	000312ND	000857SMH	192	2.5	60.06	19.59	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004216STMP	000866SMH	000312ND	128	2.5	57.55	20.44	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004220STMP	000846SMH	000614IO	158	3	-53.21	7.5	1.5	1.3	2.7	2.3	0.8	0.7	0.0	0.0	0	0	Insufficient Freeboard
2	004221STMP	004458IN	004459IN	44	3	89.05	13.12	0.4	0.9	3.4	4.7	-	1.7	0.0	0.0	0	0	Surcharged
2	004222STMP	004459IN	000907SMH	70	4	92.76	7.34	0.9	1	3.7	3.6	1.7	-	0.0	0.0	0	0	Insufficient Freeboard
2	004224STMP	002518IN	000613IO	32	5	-198.43	15.47	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004226STMP	000871SMH	002528IN	25	2	18.66	18.6	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004228STMP	002528IN	000860SMH	82	2	48.86	25.49	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004229STMP	000320ND	000861SMH	189	5.5	0.76	-0.79	0	0	-	-	-	1.8	-	0.0	0.0	0	Sufficient Capacity
2	004230STMP	000861SMH	000871SMH	134	5.5	18.67	4.02	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004235STMP	000852SMH	000853SMH	157	1.5	31.31	21.1	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004244STMP	002501IN	002502IN	97	1.5	10.26	13.14	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004246STMP	000859SMH	000858SMH	36	1.25	10.12	13.44	0	0	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004247STMP	000860SMH	000858SMH	105	3	54.71	20.12	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004248STMP	002523IN	000859SMH	6	1	10.12	13.08	0.4	0	1.9	-	-	-	0.0	0.0	0	0	Surcharged
2	004249STMP	000858SMH	000857SMH	55	3.5	64.76	11.28	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004251STMP	002527IN	000860SMH	28	1.5	6.13	10.98	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004252STMP	002529IN	002528IN	104	1.75	30.34	18.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004253STMP	002536IN	002529IN	50	1.75	30.35	13.02	0.2	0	0.8	-	-	-	0.0	0.0	0	0	Surcharged
2	004255STMP	002530IN	000861SMH	26	1.5	18.93	11.15	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004262STMP	002538IN	002536IN	84	1.5	16.76	9.45	0.1	0.2	1.0	1.0	-	-	0.0	0.0	0	0	Surcharged
2	004268STMP	000863SMH	002538IN	69	1.5	16.76	11.12	0.1	0.1	0.5	1.0	-	-	0.0	0.0	0	0	Surcharged
2	004269STMP	002336IN	000863SMH	99	1.5	16.78	10.92	0	0.1	0.2	0.5	-	-	0.0	0.0	0	0	Surcharged
2	004275STMP	002506IN	002507IN	121	2.5	21.51	10.87	0	0	-	0.3	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004276STMP	002508IN	002507IN	73	1.5	4.32	9.03	0	0	-	1.3	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004277STMP	002522IN	002507IN	248	3.5	139.54	23.66	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004278STMP	002340IN	002475IN	263	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004280STMP	004436IN	002477IN	11	1.5	0.23	1.27	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004282STMP	000907SMH	002383ND	46	3	92.79	13	1	1.4	4.6	4.2	-	-	0.0	0.0	0	0	Surcharged
2	004283STMA	000303ND	000841SMH	18	1.25	10.86	8.79	0.1	0	0.9	0.4	-	-	0.0	0.0	0	0	Surcharged
2	004283STMB	002477IN	000303ND	45	1.25	-0.56	1.57	0	0.1	0.0	0.9	-	-	0.0	0.0	0	0	Surcharged
2	004284STMP	002507IN	002339IN	216	3.5	164.93	22.15	0	0.1	-	1.5	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004285STMP	000856SMH	002518IN	192	3.5	186.57	19.39	0.2	0	2.2	-	-	-	0.0	0.0	0	0	Surcharged
2	004541STMP	000473ND	000071CB	22	2	-0.06	0.03	0	0.3	-	1.2	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004605STMP	000806SMH	000836SMH	28	5.033	288.86	19.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	004903STMP	002486IN	003546SMH	309	3.5	247.21	12.69	1.3	1.3	Flooded	4.3	Flooded	-	0.8	0.0	3546	0	Flooded
2	005417STMP	003718IN	001193SMH	81	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005418STMP	003726IN	003728IN	169	2	20.13	8.95	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005419STMP	003717IN	003726IN	28	2	20.15	9.75	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005420STMP	000071CB	003728IN	69	3	0.27	-1.3	0.3	0	0.2	-	-	-	0.0	0.0	0	0	Surcharged
2	005720STMP	001193SMH	000470ND	73	1.5	-0.55	1.34	0	0	-	1.2	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005721STMA	000470ND	000065CP	24	8	188.39	12.6	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005721STMB	000471ND	000470ND	133	8	157	12.48	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005721STMC	000469ND	000471ND	102	8	139.09	14.44	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005722STMP	003721IN	000471ND	59	3	19.8	5.33	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005725STMP	003724IN	000251IO	23	1.5	24.82	13.97	0.4	0	1.4	-	-	0.2	0.0	0.0	0	Surcharged	
2	005726STMP	000474ND	000071CB	21	1.5	-0.05	-0.03	0	0.3	-	1.7	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005730STMP	003727IN	000247IO	27	1.5	8.96	15.03	0	0	-	-	-	-	0.9	0.0	0	0	Sufficient Capacity

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
2	005732STMP	003728IN	000248IO	140	3.5	20.11	7.77	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005798STMP	000483ND	003787IN	81	5.5	142.72	26.1	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005800STMP	003790IN	003805IN	73	1.25	0	0	0	0.2	-	1.1	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005801STMP	001210SMH	001211SMH	153	2	7.88	3.32	0.1	0.2	1.7	2.5	1.9	1.7	0.0	0.0	0	0	Insufficient Freeboard
2	005803STMP	003800IN	001211SMH	32	1.5	30.37	16.96	0.2	0.2	3.2	3.0	0.6	1.7	0.0	0.0	0	0	Insufficient Freeboard
2	005804STMP	001211SMH	001212SMH	148	2.25	37.34	9.34	0.2	0.1	2.2	0.9	1.7	-	0.0	0.0	0	0	Insufficient Freeboard
2	005805STMP	001213SMH	001214SMH	286	3	41.74	7.94	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005806STMP	003804IN	001213SMH	12	1.5	-0.44	1.7	0.1	0	0.2	0.8	-	-	0.0	0.0	0	0	Surcharged
2	005807STMP	003805IN	001215SMH	24	1.5	20.85	11.75	0.2	0	0.9	2.1	-	-	0.0	0.0	0	0	Surcharged
2	005808STMP	003806IN	003805IN	339	1.5	7.71	9.85	0	0.2	-	0.9	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005809STMP	003807IN	000260IO	24	1.25	4.84	4.65	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005810STMP	000479ND	000257IO	166	1	7.27	8.77	0.4	0	Flooded	-	Flooded	0.1	0.4	0.0	136	0	Flooded
2	005811STMP	003809IN	003808IN	172	1.5	11.6	8.2	0	0	-	1.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005815STMP	003785IN	001208SMH	92	1.5	18.76	10.52	0.3	0.5	2.3	0.4	1.7	-	0.0	0.0	0	0	Insufficient Freeboard
2	005816STMP	000256IO	001208SMH	53	1.5	7.93	-4.48	23.6	0.5	Flooded	0.4	Flooded	-	0.9	0.0	6021	0	Flooded
2	005817STMP	001208SMH	000259IO	99	1.5	10.84	6.19	0.5	0	0.4	-	-	1.6	0.0	0.0	0	0	Surcharged
2	005819STMP	003787IN	003808IN	93	5.5	142.66	14.02	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005820STMP	003808IN	000258IO	34	5.5	169.18	12.38	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005821STMP	003797IN	001209SMH	7	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005822STMP	003796IN	001209SMH	57	1.5	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005823STMP	001209SMH	001210SMH	298	1.25	0	0	0	0.1	-	2.4	-	1.9	0.0	0.0	0	0	Sufficient Capacity
2	005824STMP	003795IN	001210SMH	58	1.25	7.51	10.02	0	0.1	-	2.4	-	1.9	0.0	0.0	0	0	Sufficient Capacity
2	005825STMP	003798IN	001210SMH	10	1.25	-0.32	1.68	0.1	0.1	1.6	2.4	-	1.9	0.0	0.0	0	0	Surcharged
2	005833STMP	001212SMH	001213SMH	291	2.5	41.77	8.54	0.1	0	0.7	-	-	-	0.0	0.0	0	0	Surcharged
2	005834STMP	003791IN	001213SMH	56	1.5	0	0	0	0	-	0.8	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005836STMP	000480ND	001215SMH	112	5.033	322.1	26.82	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005837STMP	001215SMH	000612IO	136	5.5	191.59	11.77	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	005838STMP	001214SMH	001215SMH	25	3	41.73	21.1	0	0	-	0.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	006317STMP	004857IN	000315ND	9	1	9.32	11.54	0.3	0.2	5.3	4.1	1.7	-	0.0	0.0	0	0	Insufficient Freeboard
2	006318STMP	000064CB	000561ND	9	1	0	0	0	0.1	-	3.6	-	-	0.0	0.0	0	0	Sufficient Capacity
2	006319STMP	000065CB	000644CB	70	1	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013307STMP	Node5178	0007790SMH	56	0.833	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013308STMP	003503SMH	Node5178	117	0.833	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013309STMP	Node5179	003505SMH	227	0.833	0	0	0	0	-	-	1.3	-	0.0	0.0	0	0	Sufficient Capacity
2	013310STMP	003506SMH	003504SMH	138	0.833	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013311STMP	003505SMH	003506SMH	140	0.833	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013312STMP	003504SMH	003503SMH	119	0.833	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	013326STMP	003541SMH	003542SMH	243	3	15.68	3.8	0.4	1	0.1	0.9	-	-	0.0	0.0	0	0	Surcharged
2	013327STMP	008954IN	003542SMH	36	1.5	-0.57	1.47	1.1	1	1.1	2.4	1.2	-	0.0	0.0	0	0	Insufficient Freeboard
2	013328STMP	000619IO	003544SMH	28	3	38.84	10.26	1.3	1.3	Flooded	3.5	Flooded	-	0.5	0.0	742	0	Flooded
2	013329STMP	003544SMH	003545SMH	24	3	41.28	5.76	1.3	1.3	3.5	3.9	-	1.7	0.0	0.0	0	0	Surcharged
2	013330STMP	003545SMH	003546SMH	182	3	43.45	6.06	1.3	1.3	3.9	4.8	1.7	-	0.0	0.0	0	0	Insufficient Freeboard
2	013331STMP	003546SMH	003547SMH	49	3.5	253.48	13.07	1.3	1.3	4.3	4.1	-	-	0.0	0.0	0	0	Surcharged
2	013332STMP	003547SMH	000314ND	17	3	253.46	35.38	1.3	0	4.6	0.5	-	-	0.0	0.0	0	0	Surcharged
2	013334STMP	003542SMH	00001PD	185	3	14.92	3.47	1	3.7	0.9	2.4	-	1.5	0.0	0.0	0	0	Surcharged
2	015104STMP	001215SMH	000611IO	133	5.5	192.36	11.82	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
2	015106STMP	000855SMH	000840SMH	130	1.5	31.31	22.08	0	0	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity
2	015110STMP	002382ND	000615IO	160	3	-52.53	7.36	1.2	1.2	2.7	1.8	0.8	0.7	0.0	0.0	0	0	Insufficient Freeboard
2	015111STMP	000848SMH	002382ND	143	3	-52.53	7.34	54.9	1.2	6.6	1.6	0.9	0.8	0.0	0.0	0	0	Insufficient Freeboard
2	015121STMP	002383ND	000849SMH	252	3	92.8	6.51	1.4	1.5	4.2	3.4	-	0.6	0.0	0.0	0	0	Surcharged
2	015124STMP	000844SMH	000819SMH	241	4	204.42	16.79	0	0	0.0	-	-	-	0.0	0.0	0	0	Surcharged
2	015127STMP	002470IN	004126SMH	19	2	41.01	13.17	0.2	0	0.6	-	1.9	-	0.0	0.0	0	0	Insufficient Freeboard
2	015131STMP	002521IN	002518IN	96	1	4.05	11.19	0	0	-	2.2	-	-	0.0	0.0	0	0	Sufficient Capacity
2	015132STMA	000309ND	002485IN	152	4.5	297.9	20.58	0	1.3	-	Flooded	-	Flooded	0.0	1.3	0	238829	Sufficient Capacity

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMainFacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
2	015132STMB	000819SMH	000309ND	46	4.5	289.03	24.08	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	015135STMP	004127SMH	004128SMH	136	2	-0.3	0.52	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	015136STMP	004128SMH	004129SMH	152	2	-0.71	0.63	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	015137STMP	004129SMH	004130SMH	247	2.5	-1.75	-0.45	0	0.8	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	015138STMP	004130SMH	009285IN	266	2.5	-2.95	-0.99	0.8	1	0.5	0.8	-	-	0.0	0.0	0	0	Surcharged	
2	015139STMP	009285IN	00001PD	121	2.5	-4.22	2.82	1	3.7	0.8	2.9	-	1.5	0.0	0.0	0	0	Surcharged	
2	015140STMP	002519IN	004132SMH	18	1.25	8.18	20.38	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	015143STMP	004132SMH	002518IN	42	1.5	8.19	11.52	0	0	-	1.7	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	CRpipe10	Node5171	Node5170	78	3	144.05	20.16	1.7	0.7	Flooded	Flooded	Flooded	Flooded	1.4	0.5	0.5	141939	681	Flooded
2	CRpipe11	Node5169	Node5168	31	3	142.62	27.25	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	CRpipe12	Node5173	Node5172	52	3	142.6	21.7	1	0	Flooded	-	Flooded	-	0.5	0.0	712	0	Flooded	
2	CRpipe13	Node5167	000483ND	613	5.5 x 10	142.79	11.21	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	CRpipe14	Node5166	000469ND	542	8	139.07	10.46	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	CRpipe20	001215IN	001211IN	256	1.25	20	17.72	0.6	0.8	4.8	Flooded	1.4	Flooded	0.0	0.7	0	7049	Insufficient Freeboard	
2	CRpipe21	001212IN	001210IN	144	1.25	21.75	20.26	0.8	0.8	6.3	Flooded	0.4	Flooded	0.0	0.7	0	1334	Insufficient Freeboard	
2	CRpipe22	001148IN	000096IO	137	0.833	4.73	8.57	2.6	2.3	Flooded	Flooded	Flooded	Flooded	2.6	1.0	18398	697	Flooded	
2	CRpipe25	000176IO	Node5185	97	1.5	19.57	10.94	0.5	0.5	3.0	RIM	2.0	RIM	0.0	0.4	0	0	Insufficient Freeboard	
2	CRpipe27	000102IO	002368IN	52	1.5	14.11	8.99	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
2	CRpipe30	Node5185	Node5186	411	1.5	9.28	5.78	0.5	1.5	RIM	RIM	RIM	RIM	0.4	0.3	0	0	Insufficient Freeboard	
2	CRpipe31	Node5186	000849SMH	127	1.5	9.28	5.22	1.5	1.5	RIM	4.4	RIM	0.6	0.3	0.0	0	0	Insufficient Freeboard	
3	000209STMP	000062IN	000224IN	22	1.75	8.44	13.03	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
3	000210STMP	000005CB	000062IN	22	1.25	8.44	13.36	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
3	000211STMP	000063IN	000005CB	14	1	8.44	10.99	0.6	0	1.2	-	-	-	0.0	0.0	0	0	Surcharged	
3	000212STMP	000064IN	000005CB	25	1	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
3	000213STMP	000065IN	000063IN	258	1	8.44	10.87	0.5	0.6	Flooded	1.2	Flooded	-	0.5	0.0	2302	0	Flooded	
3	000215STMP	000149IN	000218IN	135	1.25	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
3	000223STMP	000156IN	000057SMH	13	1	10.87	13.61	0.8	0.7	Flooded	0.5	Flooded	1.5	0.7	0.0	7024	0	Flooded	
3	000224STMP	000057SMH	000058SMH	33	1	10.87	14.57	0.7	0	0.5	-	1.5	-	0.0	0.0	0	0	Insufficient Freeboard	
3	000231STMP	000006CB	000060SMH	34	1.25	4.33	6.92	0.7	0.9	0.8	3.7	1.3	0.5	0.0	0.0	0	0	Insufficient Freeboard	
3	000236STMP	000061SMH	000062SMH	156	2	20.31	6.38	1	1	Flooded	Flooded	Flooded	Flooded	0.8	0.8	7122	6899	Flooded	
3	000238STMA	000040ND	000061SMH	125	2	17.52	5.52	0.9	1	Flooded	Flooded	Flooded	Flooded	0.2	0.8	0	7122	Flooded	
3	000238STMB	000060SMH	000040ND	32	2	17.56	6.82	0.9	0.9	2.9	Flooded	0.5	Flooded	0.0	0.2	0	0	Insufficient Freeboard	
3	000241STMP	000167IN	000062SMH	43	1.25	12.06	9.74	1	1	Flooded	Flooded	Flooded	Flooded	0.8	0.8	2136	6899	Flooded	
3	000245STMP	000058SMH	000060SMH	291	1.5	10.87	10.53	0	0.9	-	3.4	-	0.5	0.0	0.0	0	0	Sufficient Capacity	
3	000251STMA	000048ND	000064SMH	7	2.5	34.99	7.11	1	0.9	3.4	3.4	-	0.0	0.0	0.0	0	Surcharged		
3	000251STMB	000063SMH	000048ND	209	2.5	34.33	6.97	0.9	1	2.8	3.4	1.0	-	0.0	0.0	0	0	Insufficient Freeboard	
3	000252STMP	000178IN	000063SMH	160	1.5	4.16	4.23	0.2	0.9	0.1	3.8	0.8	1.0	0.0	0.0	0	0	Insufficient Freeboard	
3	000253STMA	000052ND	000063SMH	169	2.5	33.56	6.8	1	0.9	Flooded	2.8	Flooded	1.0	0.5	0.0	4	0	Flooded	
3	000253STMB	000062SMH	000052ND	34	2.5	29.13	5.9	1	1	Flooded	Flooded	Flooded	Flooded	0.8	0.5	6899	4	Flooded	
3	000254STMP	000177IN	000064SMH	13	1.25	7.37	5.88	1	0.9	4.1	4.7	-	-	0.0	0.0	0	0	Surcharged	
3	000255STMP	000064SMH	000049ND	45	2.5	54.07	10.96	0.9	0.6	3.4	2.9	-	-	0.0	0.0	0	0	Surcharged	
3	000258STMP	000181IN	000048ND	42	1.25	3.61	6.03	0.3	1	0.9	4.7	-	-	0.0	0.0	0	0	Surcharged	
3	000264STMP	000185IN	000066SMH	21	0.667	7.14	18.36	1.7	0.5	12.5	4.8	-	-	0.0	0.0	0	0	Surcharged	
3	000265STMP	000066SMH	000068SMH	68	3.5	86.62	8.97	0.5	0.5	1.9	2.0	-	-	0.0	0.0	0	0	Surcharged	
3	000266STMA	000045ND	000066SMH	142	1.75	26.91	10.97	0.5	0.5	5.5	3.7	-	-	0.0	0.0	0	0	Surcharged	
3	000266STMB	000078SMH	000045ND	127	1.75	26.89	10.9	0.4	0.5	7.1	5.5	1.9	-	0.0	0.0	0	0	Insufficient Freeboard	
3	000267STMP	000065SMH	000066SMH	304	3.5	54.66	7.09	0.4	0.5	1.4	1.9	-	-	0.0	0.0	0	0	Surcharged	
3	000270STMP	000186IN	000068SMH	33	1.25	16.73	13.4	0.4	0.5	3.5	4.2	-	-	0.0	0.0	0	0	Surcharged	
3	000272STMP	000068SMH	000069SMH	313	3.5	102.2	11.13	0.5	0	2.0	-	-	0.0	0.0	0	0	Surcharged		
3	000273STMA	000042ND	000068SMH	72	3.5	107.07	12.72	1	1.3	2.5	Flooded	0.6	Flooded	0.0	0.9	0	14975	Insufficient Freeboard	
3	000273STMB	000069SMH	000042ND	178	3.5	102.19	18.8	0	1	-	2.5	-	0.6	0.0	0	0	Sufficient Capacity		
3	000274STMP	000189IN	000075SMH	46	1	5.07	11.26	0	1	-	2.5	-	1.4	0.0	0.0	0	0	Sufficient Capacity	
3	000276STMP	000075SMH	000042ND	28	1.25	5.04	7.43	1	1	2.2	4.8	1.4	0.6	0.0	0.0	0	0	Insufficient Freeboard	
3	000277STMP	000076SMH	009284IN	128	3.5	100.15	10.3	1.3	1.8	Flooded	Flooded	Flooded	Flooded	0.9	1.1	14975	17772	Flooded	

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGGravityMainFacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
3	000279STMP	000191IN	000045ND	284	1.25	-1.12	1.48	0.2	0.5	1.1	6.0	0.7	-	0.0	0.0	0	0	Insufficient Freeboard
3	000284STMP	000079SMH	000078SMH	35	1.75	22.37	9.07	0.4	0.4	7.1	7.1	1.6	1.9	0.0	0.0	0	0	Insufficient Freeboard
3	000284STMP	000080SMH	000079SMH	191	1.5	-1.62	2.84	0.2	0.4	3.4	7.3	1.9	1.6	0.0	0.0	0	0	Insufficient Freeboard
3	000288STMP	000099CB	000078SMH	36	1.25	4.88	8.24	0.3	0.4	5.0	7.6	-	1.9	0.0	0.0	0	0	Surcharged
3	000290STMA	000043ND	000079SMH	17	1.75	11.81	4.93	0.4	0.4	7.0	7.1	1.8	1.6	0.0	0.0	0	0	Insufficient Freeboard
3	000290STMB	000198IN	000043ND	13	1.75	12.25	4.99	0.4	0.4	7.0	7.0	1.6	1.8	0.0	0.0	0	0	Insufficient Freeboard
3	000299STMP	000081SMH	000080SMH	215	1.25	-0.66	1.55	0	0.2	-	3.7	-	1.9	0.0	0.0	0	0	Sufficient Capacity
3	000301STMP	000201IN	000081SMH	12	1.25	-0.05	0.22	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	000305STMP	000174IN	000052ND	30	1.25	8.24	7.1	0.9	1	Flooded	Flooded	Flooded	Flooded	0.7	0.5	1481	4	Flooded
3	000306STMP	000091SMH	000090SMH	160	1.25	6.93	5.62	0.6	0.6	Flooded	Flooded	Flooded	Flooded	0.4	0.1	1217	103	Flooded
3	000307STMP	000092SMH	000090SMH	135	1.5	13.92	7.72	0.5	0.6	4.9	Flooded	0.3	Flooded	0.0	0.1	0	103	Insufficient Freeboard
3	000308STMP	000211IN	000091SMH	45	1.25	6.91	5.6	0.6	0.6	Flooded	Flooded	Flooded	Flooded	0.5	0.4	3443	1217	Flooded
3	000309STMA	000051ND	000092SMH	20	1.25	7.41	8.38	0.4	0.5	3.9	5.2	1.0	0.3	0.0	0.0	0	0	Insufficient Freeboard
3	000309STMB	000015CB	000051ND	20	1.25	7.33	10.54	0.3	0.4	2.7	3.9	0.6	1.0	0.0	0.0	0	0	Insufficient Freeboard
3	000310STMP	000093SMH	000092SMH	51	1.25	1.11	0.91	0.2	0.5	1.6	5.2	1.2	0.3	0.0	0.0	0	0	Insufficient Freeboard
3	000311STMP	000218IN	000093SMH	194	1.25	0	0	0	0.2	-	1.6	-	1.2	0.0	0.0	0	0	Sufficient Capacity
3	000321STMP	000220IN	000221IN	104	2	8.44	10.73	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	000322STMP	000222IN	000221IN	93	1.25	7.09	7.04	0	0	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity
3	000325STMP	000224IN	000220IN	10	1.5	8.44	10.33	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	000478STMP	000011CB	000047ND	36	1	4.63	8.57	0.3	0.5	2.4	4.7	1.9	-	0.0	0.0	0	0	Insufficient Freeboard
3	000479STMP	000089SMH	000088SMH	41	1.5	15.05	10.24	0.5	0.5	3.4	3.9	1.2	1.4	0.0	0.0	0	0	Insufficient Freeboard
3	000480STMP	000012CB	000088SMH	48	1	7.64	10.67	0.3	0.5	3.0	4.4	0.1	1.4	0.0	0.0	0	0	Insufficient Freeboard
3	000484STMP	000090SMH	000089SMH	122	1.5	14.89	8.36	0.6	0.5	Flooded	3.4	Flooded	1.2	0.1	0.0	103	0	Flooded
3	000487STMA	000047ND	000064SMH	257	2	26.16	8.23	0.5	0.9	3.7	3.9	-	-	0.0	0.0	0	0	Surcharged
3	000487STMB	000088SMH	000047ND	51	2	21.56	7.54	0.5	0.5	3.4	3.7	1.4	-	0.0	0.0	0	0	Insufficient Freeboard
3	007038STMP	004516IN	004526IN	31	3	51.76	7.29	1.2	1.3	Flooded	Flooded	Flooded	Flooded	1.2	1.2	15302	20100	Flooded
3	007041STMP	004524IN	004527IN	118	1	0	0	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	007042STMP	001733SMH	001733SMH	290	2	6.48	5.36	0	0.9	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity
3	007043STMP	001733SMH	001734SMH	45	2	10.99	9.76	0.9	1.2	0.5	2.4	-	-	0.0	0.0	0	0	Surcharged
3	007044STMP	004528IN	001736SMH	64	1	5.18	7.22	1.2	1.2	3.8	4.6	-	-	0.0	0.0	0	0	Surcharged
3	007046STMP	004527IN	001729SMH	241	1	-0.09	0.4	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	007048STMP	004530IN	004528IN	142	1	5.2	6.47	1.2	1.2	3.6	3.8	0.0	-	0.0	0.0	0	0	Insufficient Freeboard
3	007049STMP	001736SMH	001737SMH	33	2	17.8	8.66	1.2	1.3	3.6	4.4	-	0.7	0.0	0.0	0	0	Surcharged
3	007050STMP	001737SMH	001738SMH	59	2	18.28	7.7	1.3	1.4	4.4	Flooded	0.7	Flooded	0.0	1.1	0	5766	Insufficient Freeboard
3	007051STMP	001738SMH	001739SMH	44	2	18.8	5.94	1.4	1.5	Flooded	Flooded	Flooded	Flooded	1.1	0.7	5766	1803	Flooded
3	007052STMP	001739SMH	004526IN	66	2	22.36	7.06	1.5	1.3	Flooded	Flooded	Flooded	Flooded	0.7	1.2	1803	20100	Flooded
3	007053STMP	004526IN	009284IN	90	3	66.82	9.37	1.3	1.8	Flooded	Flooded	Flooded	Flooded	1.2	1.1	20100	17772	Flooded
3	007317STMP	004513IN	004514IN	104	2	14.47	8.02	1.2	1.2	Flooded	Flooded	Flooded	Flooded	0.6	1.0	1123	5553	Flooded
3	007318STMP	001707SMH	004513IN	69	1.25	5.82	6.96	1.2	1.2	2.6	Flooded	1.9	Flooded	0.0	0.6	0	1123	Insufficient Freeboard
3	007319STMP	001708SMH	004513IN	102	1	2.65	6.21	1.2	1.2	1.3	Flooded	1.3	Flooded	0.0	0.6	0	1123	Insufficient Freeboard
3	007320STMP	004514IN	004515IN	77	2	25.49	9.21	1.2	1.2	Flooded	Flooded	Flooded	Flooded	1.0	1.1	5553	7187	Flooded
3	007321STMP	004515IN	004516IN	23	2.5	55.21	11.79	1.2	1.2	Flooded	Flooded	Flooded	Flooded	1.1	1.2	7187	15302	Flooded
3	007322STMP	001710SMH	001707SMH	40	1.25	4.45	5.62	1.2	1.2	2.0	2.6	2.0	1.9	0.0	0.0	0	0	Insufficient Freeboard
3	007323STMP	001709SMH	001708SMH	52	1	1	2.95	1	1.2	0.6	1.3	1.8	1.3	0.0	0.0	0	0	Insufficient Freeboard
3	007324STMP	000654ND	001709SMH	35	1	0	0	1	-	0.6	1.5	1.8	0.0	0.0	0	0	Sufficient Capacity	
3	007325STMP	004517IN	001710SMH	57	1.25	3.54	5.6	1.1	1.2	1.2	2.0	1.9	2.0	0.0	0.0	0	0	Insufficient Freeboard
3	007326STMP	004518IN	004517IN	37	1.25	1.31	3.53	0.1	1.1	0.0	1.2	1.8	1.9	0.0	0.0	0	0	Insufficient Freeboard
3	007328STMP	004522IN	004519IN	82	1	6.42	-8.06	1.9	2.2	0.7	Flooded	1.3	Flooded	0.0	1.9	0	4813	Insufficient Freeboard
3	007331STMP	004522IN	001711SMH	65	1	6.42	8.14	1.9	0	0.7	-	1.3	-	0.0	0.0	0	0	Insufficient Freeboard
3	007332STMP	001711SMH	001712SMH	72	1.25	6.42	6.33	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	007333STMP	001712SMH	001713SMH	194	1.5	6.42	4.5	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
3	015105STMP	009284IN	000077SMH	36	3.5	-105.69	10.86	1.8	1.5	Flooded	5.9	Flooded	1.1	1.1	0.0	17772	0	Flooded
3	015107STMP	000049ND	000065SMH	117	3	54.22	7.63	0.6	0.4	2.4	1.9	-	-	0.0	0.0	0	0	Surcharged
3	015123STMP	000077SMH	002399ND	312	4	-105.68	8.34	1.5	1.2	5.4	Flooded	1.1	Flooded	0.0	1.2	0	211	Insufficient Freeboard

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMainFacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
3	015126STMP	000221IN	002394ND	147	2	23.53	10.48	0	0	-	-	-	-	1.0	0.0	0.0	0	Sufficient Capacity	
3	CRpipe15	001729SMH	004518IN	95	1	0.43	1.17	0	0.1	-	0.3	-	-	1.8	0.0	0.0	0	Sufficient Capacity	
3	CRpipe16	002394ND	Node5165	225	2	23.54	9.57	0	0	-	-	-	-	1.0	-	0.0	0.0	Sufficient Capacity	
3	CRpipe17	002399ND	Node5183	364	3.5	105.68	10.99	1.2	0	Flooded	-	-	-	Flooded	1.4	1.2	0.0	211	Flooded
3	CRpipe18	Node5165	Node5181	290	2	23.52	9.57	0	0	-	-	-	-	0.5	0.0	0.0	0	Sufficient Capacity	
3	CRpipe19	000053ND	Node5182	673	3	44.84	14.14	0	0	-	-	-	-	1.6	0.0	0.0	0	Sufficient Capacity	
3	CRpipe23	001734SMH	001736SMH	100	2	12.61	6.72	1.2	1.2	2.4	3.6	-	-	0.0	0.0	0.0	0	Surcharged	
4	000455STMP	001372IN	001373IN	154	1.5	20.58	11.51	0.1	0	1.9	0.2	-	-	0.0	0.0	0.0	0	Surcharged	
4	000456STMP	001377IN	001372IN	96	1.5	20.66	19.22	0	0.1	-	1.7	1.6	-	0.0	0.0	0.0	0	Sufficient Capacity	
4	000570STMP	000451SMH	000452SMH	154	1.5	25.79	16.37	0.4	0.5	Flooded	Flooded	Flooded	Flooded	0.3	0.4	1550	4736	Flooded	
4	000703STMP	001381IN	001504IN	125	2	45.97	21.71	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	000705STMP	000450SMH	000451SMH	242	1.5	27.05	16.96	0.3	0.4	Flooded	Flooded	Flooded	Flooded	0.3	0.3	1021	1550	Flooded	
4	000782STMP	000461SMH	000462SMH	161	3	120.74	23.27	0	0	-	-	-	-	0.0	0.0	0.0	0	Sufficient Capacity	
4	000783STMP	000470SMH	000461SMH	378	3	88.02	21.77	0	0	-	-	-	-	0.0	0.0	0.0	0	Sufficient Capacity	
4	000784STMP	000224ND	000461SMH	131	1	17.33	20.24	0.3	0	Flooded	-	Flooded	-	0.3	0.0	234	0	Flooded	
4	000787STMP	000462SMH	000463SMH	164	3	120.81	23.93	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	000788STMP	000463SMH	001493IN	451	3	137.49	24.86	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	000789STMP	001493IN	001494IN	167	3	137.45	24.11	0	0.1	-	1.7	-	1.3	0.0	0.0	0	0	Sufficient Capacity	
4	000790STMP	001494IN	001495IN	50	3	146.63	23.65	0.1	0.2	2.2	2.4	1.3	-	0.0	0.0	0	0	Insufficient Freeboard	
4	000791STMP	001495IN	001500IN	109	3	146.62	21.14	0.2	0.2	2.6	1.6	-	-	0.0	0.0	0	0	Surcharged	
4	000924STMP	000689SMH	000690SMH	156	1.5	16.19	14.54	0	0.5	-	Flooded	-	Flooded	0.0	0.5	0	5196	Sufficient Capacity	
4	000925STMP	000690SMH	000691SMH	97	1.5	27.04	14.98	0.5	0.5	Flooded	1.8	Flooded	1.1	0.5	0.0	5196	0	Flooded	
4	000928STMP	000691SMH	000692SMH	17	1.5	27.07	15.19	0.5	0	1.9	0.4	1.1	-	0.0	0.0	0	0	Insufficient Freeboard	
4	000929STMP	000692SMH	000159IO	154	3.5	69.5	9.48	0	0	-	-	-	1.4	0.0	0.0	0	0	Sufficient Capacity	
4	001434STMP	000464SMH	000465SMH	36	4	185.02	15.87	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	001435STMP	001497IN	00266IN	71	4	-169.35	12.97	0.3	0	0.7	-	1.3	-	0.0	0.0	0	0	Insufficient Freeboard	
4	001436STMP	001496IN	000464SMH	73	2	16.14	12.23	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	001437A	000465SMH	000222ND	85	4	185.32	16.43	0	0.1	-	0.1	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	001437B	000222ND	000458SMH	10	4	185.56	14.73	0.1	0	0.1	-	-	-	0.0	0.0	0	0	Surcharged	
4	001438STMP	001498IN	001497IN	248	2.5	75.28	15.25	0.2	0.3	Flooded	0.7	Flooded	1.3	0.1	0.0	17	0	Flooded	
4	001439STMP	001501IN	000466SMH	268	2.5	76.7	15.81	0.3	0.3	Flooded	3.0	Flooded	1.3	0.2	0.0	2724	0	Flooded	
4	001442STMP	001500IN	001501IN	79	2.5	71.28	18.33	0.2	0.3	3.1	Flooded	-	Flooded	0.0	0.2	0	2724	Surcharged	
4	001444STMP	001500IN	001498IN	347	2.5	75.38	16.26	0.2	0.2	3.1	Flooded	-	Flooded	0.0	0.1	0	17	Surcharged	
4	001447STMP	000466SMH	001497IN	249	2.5	76.71	15.5	0.3	0.3	3.2	0.7	1.3	1.3	0.0	0.0	0	0	Insufficient Freeboard	
4	002078STMP	000633SMH	000632SMH	115	1.25	7.05	10.6	0	0.1	-	1.1	-	0.9	0.0	0.0	0	0	Sufficient Capacity	
4	002111STMP	000452SMH	000453SMH	121	1.5	31.03	17.31	0.5	0.3	Flooded	6.1	Flooded	1.5	0.4	0.0	4736	0	Flooded	
4	002116STMP	000453SMH	000456SMH	104	3.5	174.79	18.04	0.3	0.3	4.1	3.2	1.5	0.8	0.0	0.0	0	0	Insufficient Freeboard	
4	002166STMP	001897IN	001898IN	69	1.25	14.98	12.05	0.2	0	2.9	0.5	0.5	-	0.0	0.0	0	0	Insufficient Freeboard	
4	002167STMP	001898IN	00641SMH	212	1.75	15.01	8.12	0	0.2	0.1	1.6	-	1.0	0.0	0.0	0	0	Surcharged	
4	002169STMP	000641SMH	001901IN	46	2.25	31.75	8.2	0.2	0.2	1.5	1.5	1.0	1.2	0.0	0.0	0	0	Insufficient Freeboard	
4	002171STMP	001901IN	001902IN	67	2.25	31.75	7.95	0.2	0.3	1.5	1.7	1.2	1.5	0.0	0.0	0	0	Insufficient Freeboard	
4	002172STMP	001902IN	001481IN	89	2.25	31.79	7.96	0.3	0.3	1.7	1.4	1.5	-	0.0	0.0	0	0	Insufficient Freeboard	
4	002355STMP	000438SMH	000440SMH	96	1.5	12.46	10.56	0.1	0.3	0.2	Flooded	-	Flooded	0.0	0.2	0	1335	Surcharged	
4	002364STMP	000440SMH	000449SMH	53	1.5	21.37	12.61	0.3	0.3	Flooded	Flooded	Flooded	Flooded	0.2	0.2	1335	63	Flooded	
4	002367STMP	000449SMH	000450SMH	51	1.5	21.25	13.81	0.3	0.3	Flooded	Flooded	Flooded	Flooded	0.2	0.3	63	1021	Flooded	
4	002458STMP	001373IN	001374IN	43	1.5	20.52	13.5	0	0.1	0.3	0.7	-	-	0.0	0.0	0	0	Surcharged	
4	002459STMP	001374IN	001375IN	58	1.5	20.53	11.58	0.1	0	0.9	-	-	-	0.0	0.0	0	0	Surcharged	
4	002460STMP	001375IN	009956IN	66	1.5	28.27	29.81	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	002462STMP	001378IN	001379IN	29	1.25	9.72	8.63	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	002464STMP	001379IN	001380IN	130	1.5	9.72	13.41	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	002465STMP	001380IN	001381IN	98	2	45.97	20.17	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	002466STMP	001382IN	001380IN	176	1.75	31.37	19.69	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	
4	002467STMP	001383IN	001382IN	131	1.25	19.21	15.35	0.1	0	4.4	-	-	-	0.0	0.0	0	0	Surcharged	
4	002468STMP	000429SMH	001382IN	85	1.5	12.44	13.77	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity	

TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS	
4	002470STMP	001388IN	001383IN	145	1.5	10.31	10.79	0	0.1	-	2.5	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002473STMP	000428SMH	000429SMH	227	1.5	12.43	14.32	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002486STMP	000435SMH	000460SMH	116	1.5	13.74	18.56	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002497STMP	000436SMH	000447SMH	252	2.5	98.81	21.97	0.2	0.4	2.4	2.0	-	1.5	0.0	0.0	0	0	Surcharged
4	002500STMP	000437SMH	000448SMH	46	1.25	12.51	16.03	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002508STMP	000448SMH	000438SMH	303	1.5	12.47	15.59	0	0.1	-	0.2	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002509STMP	002929ND	000436SMH	157	2.25	81.65	20.35	0.4	0.2	3.7	0.9	-	-	0.0	0.0	0	0	Surcharged
4	002513STMP	000443SMH	000442SMH	130	3.5	152.3	25.29	0	0.1	-	0.7	-	0.3	0.0	0.0	0	0	Sufficient Capacity
4	002514STMP	000445SMH	000443SMH	175	3.5	143.26	16.84	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002523STMP	000442SMH	000453SMH	95	3.5	152.26	22.79	0.1	0.3	0.7	4.1	0.3	1.5	0.0	0.0	0	0	Insufficient Freeboard
4	002524STMP	000454SMH	009267IN	139	3.5	129.36	14.09	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002525STMP	000446SMH	000445SMH	80	1.5	9.16	13.57	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002530STMP	000447SMH	000468SMH	179	2.5	98.81	21.55	0.4	0	2.0	-	1.5	-	0.0	0.0	0	0	Insufficient Freeboard
4	002603STMP	000693SMH	000692SMH	12	1.75	10.47	10.72	0	0	-	0.5	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002605STMP	000694SMH	000693SMH	170	1.5	10.36	5.92	1.3	0	0.5	-	-	-	0.0	0.0	0	0	Surcharged
4	002607STMP	000695SMH	000694SMH	148	1.5	10.36	5.84	1.3	1.3	1.1	0.4	1.9	-	0.0	0.0	0	0	Insufficient Freeboard
4	002609STMP	000696SMH	000695SMH	54	1.25	10.36	8.34	1.4	1.3	2.5	1.4	0.6	1.9	0.0	0.0	0	0	Insufficient Freeboard
4	002655STMP	000456SMH	000457SMH	245	3.5	182.44	18.77	0.3	0.3	3.2	0.5	0.8	-	0.0	0.0	0	0	Insufficient Freeboard
4	002658STMP	001481IN	000457SMH	36	2.25	31.8	7.96	0.3	0.3	1.7	1.8	-	-	0.0	0.0	0	0	Surcharged
4	002660STMP	000457SMH	000458SMH	32	3.5	214.13	21.33	0.3	0	0.5	-	-	-	0.0	0.0	0	0	Surcharged
4	002664STMP	000455SMH	000454SMH	122	1.5	9.72	10.15	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002665STMP	000459SMH	000469SMH	139	1.75	20.94	15.62	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002666STMP	000460SMH	000459SMH	143	1.75	13.71	11.64	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002667STMP	000468SMH	000454SMH	150	3	119.72	22.24	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002668STMP	000469SMH	000468SMH	132	1.5	20.95	13.34	0	0	-	0.6	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002670STMP	000227ND	0009962IN	351	3	76.66	21.06	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002724STMP	002061IN	000266ND	66	1.25	16.17	15.3	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002725B	000266ND	000689SMH	185	1.5	16.18	18.61	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	002973STMP	000632SMH	000639SMH	98	1.25	10.77	11.95	0.1	0.2	1.1	Flooded	0.9	Flooded	0.0	0.1	0	59	Insufficient Freeboard
4	003356A	001883IN	000234ND	59	5	424.56	26.45	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003356B	000234ND	000634SMH	28	5	425.17	25.86	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003357STMP	001884IN	001883IN	164	5	411.68	28.89	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003358STMP	000458SMH	004097SMH	70	5.4	399.27	26.84	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003359STMP	001885IN	004097SMH	33	1.5	11.22	11	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003360STMP	001886IN	001885IN	244	1.5	11.22	10.29	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003362STMP	000634SMH	000638SMH	347	5	422.19	25.3	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003401STMP	000674SMH	000675SMH	33	1.25	8.25	9.97	0.1	0.2	2.9	Flooded	0.9	Flooded	0.0	0.1	0	97	Insufficient Freeboard
4	003407STMP	000675SMH	000676SMH	54	1.5	18.93	10.54	0.2	0.2	Flooded	3.7	Flooded	0.8	0.1	0.0	97	0	Flooded
4	003408STMP	000639SMH	000675SMH	142	1.25	10.62	9.18	0.2	0.2	Flooded	Flooded	Flooded	Flooded	0.1	0.1	59	97	Flooded
4	003409STMP	000676SMH	000677SMH	180	5.5	453.19	19.25	0.2	0.2	2.1	1.8	0.8	0.7	0.0	0.0	0	0	Insufficient Freeboard
4	003410A	000638SMH	000275ND	218	5.5	436.75	24.2	0	0.1	-	1.3	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003410B	000275ND	000675SMH	87	5.5	436.46	21.93	0.1	0.2	1.3	2.1	-	0.8	0.0	0.0	0	0	Surcharged
4	003411STMP	000677SMH	000678SMH	223	5.5	460.35	19.31	0.2	0.1	1.8	0.2	0.7	-	0.0	0.0	0	0	Insufficient Freeboard
4	003413STMP	000678SMH	000146IO	36	5.5	460.71	19.09	0.1	0	0.2	-	-	1.5	0.0	0.0	0	0	Surcharged
4	003426STMP	000684SMH	000692SMH	280	2.5	33.13	7.59	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003427STMP	000685SMH	000684SMH	40	2	33.1	10.27	0.2	0	0.4	-	-	-	0.0	0.0	0	0	Surcharged
4	003429STMP	000686SMH	000685SMH	84	1.75	33.09	13.58	0.4	0.2	3.1	0.4	1.3	-	0.0	0.0	0	0	Insufficient Freeboard
4	003431STMP	000687SMH	000686SMH	190	1.5	21.04	11.68	0.2	0.4	4.7	3.3	1.3	1.3	0.0	0.0	0	0	Insufficient Freeboard
4	003433STMP	000688SMH	000687SMH	350	1.5	12.67	10.83	0	0.2	-	4.6	-	1.3	0.0	0.0	0	0	Sufficient Capacity
4	003437STMP	002057IN	000688SMH	54	1.25	12.76	11.19	0	0	-	-	-	-	0.0	0.0	0	0	Sufficient Capacity
4	003440STMP	000697SMH	000695SMH	36	1.25	10.52	8.52	1.4	1.4	Flooded	2.3	Flooded	0.6	1.2	0.0	1353	0	Flooded
4	003442STMP	000698SMH	000697SMH	117	1.25	11.12	8.85	1.4	1.4	Flooded	Flooded	Flooded	Flooded	1.3	1.2	13213	1353	Flooded
4	003443STMP	000699SMH	000698SMH	184	1.25	18.83	14.99	0.4	1.4	Flooded	Flooded	Flooded	Flooded	0.4	1.3	2028	13213	Flooded
4	003452STMP	000702SMH	000703SMH	165	1.25	17.49	14.05	0.2	0	3.2	0.0	0.5	0.2	0.0	0.0	0	0	Insufficient Freeboard

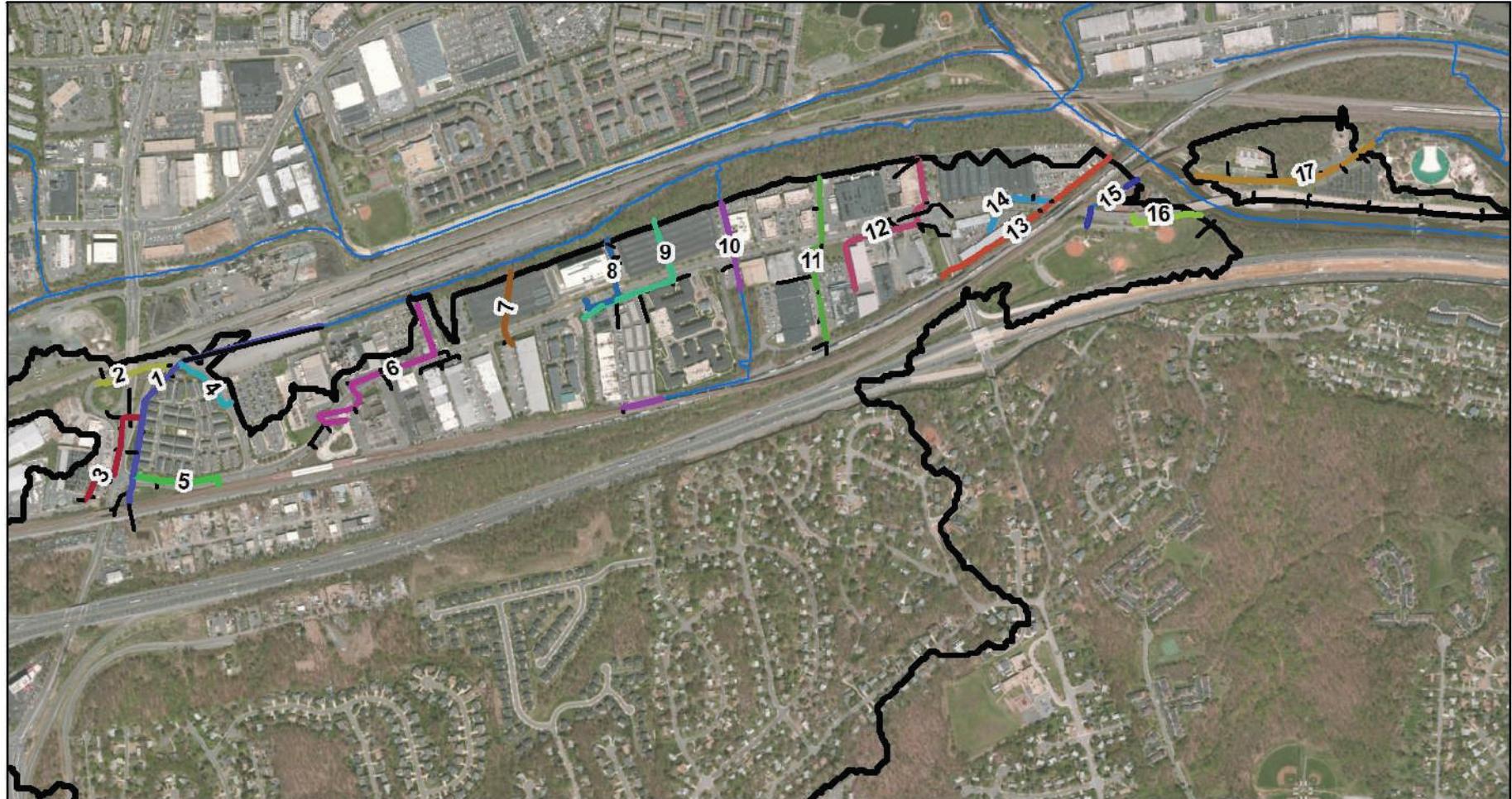
TABLE 1

Cameron Run Detailed Hydraulic Model Results

Subshed	DGravityMain FacilityID	Junction FacilityID			Diameter/ Height x Width (ft)	Maximum Flow (ft³/s)	Maximum Velocity (fps)	Duration of Surcharge (hrs)		Surcharge/ Depth Above Crown (ft)		Insufficient Freeboard/ Depth Below Rim (ft)		Duration of Flooding (hrs)		Flooded Volume (ft³)		Summary Pipe Condition	
		US	DS	Length (ft)				US	DS	US	DS	US	DS	US	DS	US	DS		
4	003456STMP	000703SMH	000704SMH	123	1.5	17.48	12.02	0	0.6	-	Flooded	0.2	Flooded	0.0	0.6	0	3853	Sufficient Capacity	
4	003462STMP	000704SMH	000705SMH	209	1.75	15.47	6.38	0.6	0.6	Flooded	Flooded	Flooded	Flooded	0.6	0.1	3853	186	Flooded	
4	003466STMP	000705SMH	000706SMH	142	1.75	21.6	8.89	0.6	0.6	Flooded	1.3	Flooded	1.3	0.1	0.0	0	0	0	Flooded
4	003469STMP	000706SMH	000707SMH	150	2.25	21.62	5.42	0.6	0.5	1.2	0.7	1.3	1.3	0.0	0.0	0	0	0	Insufficient Freeboard
4	003472STMP	000707SMH	000709SMH	155	2.25	-28.42	7.22	0.5	0	0.9	-	1.3	-	0.0	0.0	0	0	0	Insufficient Freeboard
4	003473STMP	000719SMH	000707SMH	175	1.25	7.28	6.47	0	0.5	-	1.1	1.9	1.3	0.0	0.0	0	0	0	Sufficient Capacity
4	003479STMP	000708SMH	000709SMH	24	1.25	6.89	9.8	0	0	-	0.1	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	003481STMP	000709SMH	000710SMH	29	2.25	35.23	8.49	0	0	0.2	0.3	-	-	0.0	0.0	0	0	0	Surcharged
4	003484STMP	000710SMH	000147IO	25	2.25	-37.94	9.19	0	0	0.3	-	-	1.9	0.0	0.0	0	0	0	Surcharged
4	003744STMP	002885IN	001388IN	162	1.5	10.36	11.03	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	003745STMP	002886IN	002885IN	42	1.25	3.46	6.49	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	003746STMP	000347ND	002886IN	62	1.25	3.46	12.89	0	0	-	-	1.4	-	0.0	0.0	0	0	0	Sufficient Capacity
4	003915STMP	002313IN	001496IN	232	1.25	16.01	12.77	1.5	0	Flooded	-	Flooded	-	1.5	0.0	29586	0	Flooded	
4	004536STMP	002830IN	000879SMH	61	1.25	8.41	6.78	0.6	0.6	Flooded	Flooded	Flooded	Flooded	0.5	0.4	2880	640	Flooded	
4	004537STMP	000879SMH	002837IN	153	1.25	11.89	10.34	0.6	0	Flooded	3.0	Flooded	-	0.4	0.0	640	0	Flooded	
4	004545STMP	002837IN	002838IN	35	1.5	11.92	8.99	0	0.6	2.9	3.8	-	-	0.0	0.0	0	0	0	Surcharged
4	004546STMP	002838IN	009268IN	159	2	28.54	8.98	0.6	0.6	3.8	2.1	-	-	0.0	0.0	0	0	0	Surcharged
4	004547STMP	000880SMH	002838IN	88	1.5	17.57	9.76	0.6	0.6	4.6	3.8	-	-	0.0	0.0	0	0	0	Surcharged
4	004548STMP	002845IN	000880SMH	227	1.25	9.65	7.74	0.6	0.6	4.7	4.8	-	-	0.0	0.0	0	0	0	Surcharged
4	004557STMP	002843IN	002845IN	102	1.25	9.53	7.6	0.6	0.6	Flooded	4.4	Flooded	-	0.6	0.0	2865	0	Flooded	
4	004587STMP	002883IN	002884IN	184	1.25	6.95	5.94	0.1	0	1.6	-	-	-	0.0	0.0	0	0	0	Surcharged
4	004588STMP	002884IN	000894SMH	42	1.25	6.95	12.25	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	004589STMP	000894SMH	002885IN	127	1.5	6.95	10.79	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015059STMP	001434IN	002929ND	57	2.25	81.64	20.27	0.4	0.4	4.8	3.7	1.3	-	0.0	0.0	0	0	0	Insufficient Freeboard
4	015061STMP	009956IN	001506IN	82	1.5	28.27	27.21	0	0.4	-	Flooded	-	Flooded	0.0	0.4	0	11511	0	Sufficient Capacity
4	015080STMP	009621IN	000470SMH	116	3	76.7	20.88	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015081STMP	000590IO	000227ND	15	3	55.94	13.67	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015102STMP	009267IN	000445SMH	106	3.5	134.22	15.13	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015103STMP	009266IN	000464SMH	122	4	170.07	18.51	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015113STMP	009268IN	000178IO	198	2	28.55	9.42	0.6	0	2.1	-	-	-	0.0	0.0	0	0	0	Surcharged
4	015114STMP	004097SMH	001884IN	58	5	411.22	29.87	0	0	-	-	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015117STMP	001504IN	001505IN	270	2.25	67.03	22.98	0	0.2	-	1.8	-	-	0.0	0.0	0	0	0	Sufficient Capacity
4	015118STMP	001505IN	001506IN	94	2.25	78.76	22.03	0.2	0.4	3.5	Flooded	-	Flooded	0.0	0.4	0	11511	0	Surcharged
4	015119STMP	001506IN	001434IN	81	2.25	81.65	20.21	0.4	0.4	Flooded	4.3	Flooded	1.3	0.4	0.0	11511	0	Flooded	

TABLE 2
Cameron Run Outfall Boundary Conditions

Node ID	Location	Boundary Condition
Node5163	Cameron Run West	Type 1, Free Outfall
Node5164	Cameron Run West	Type 1, Free Outfall
000222IO	Cameron Run West	Type 1, Free Outfall
000223IO	Cameron Run West	Type 1, Free Outfall
000225IO	Cameron Run West	Type 1, Free Outfall
000230IO	Cameron Run West	Type 1, Free Outfall
000233IO	Cameron Run West	Type 1, Free Outfall
000239IO	Cameron Run West	Type 1, Free Outfall
000242IO	Cameron Run West	Type 1, Free Outfall
000245IO	Cameron Run West	Type2, Fixed Backwater
000234IO	Cameron Run West	Type 1, Free Outfall
000235IO	Cameron Run West	Type 1, Free Outfall
000236IO	Cameron Run West	Type 1, Free Outfall
000237IO	Cameron Run West	Type 1, Free Outfall
000243IO	Cameron Run West	Type 1, Free Outfall
000244IO	Cameron Run West	Type 1, Free Outfall
000250IO	Cameron Run West	Type 1, Free Outfall
000065CP	Cameron Run Center	Type 1, Free Outfall
000248IO	Cameron Run Center	Type 1, Free Outfall
000258IO	Cameron Run Center	Type 1, Free Outfall
000612IO	Cameron Run Center	Type 1, Free Outfall
000611IO	Cameron Run Center	Type 1, Free Outfall
000247IO	Cameron Run Center	Type 1, Free Outfall
000251IO	Cameron Run Center	Type 1, Free Outfall
000257IO	Cameron Run Center	Type 1, Free Outfall
000259IO	Cameron Run Center	Type 1, Free Outfall
000260IO	Cameron Run Center	Type 1, Free Outfall
Node5181	Cameron Run Southeast	Computed Tide Coefficeints
Node5182	Cameron Run Southeast	Computed Tide Coefficeints
Node5183	Cameron Run Southeast	Computed Tide Coefficeints
000146IO	Cameron Run North	Type 1, Free Outfall
000147IO	Cameron Run North	Type 1, Free Outfall
000159IO	Cameron Run North	Type 1, Free Outfall



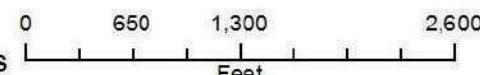
Legend

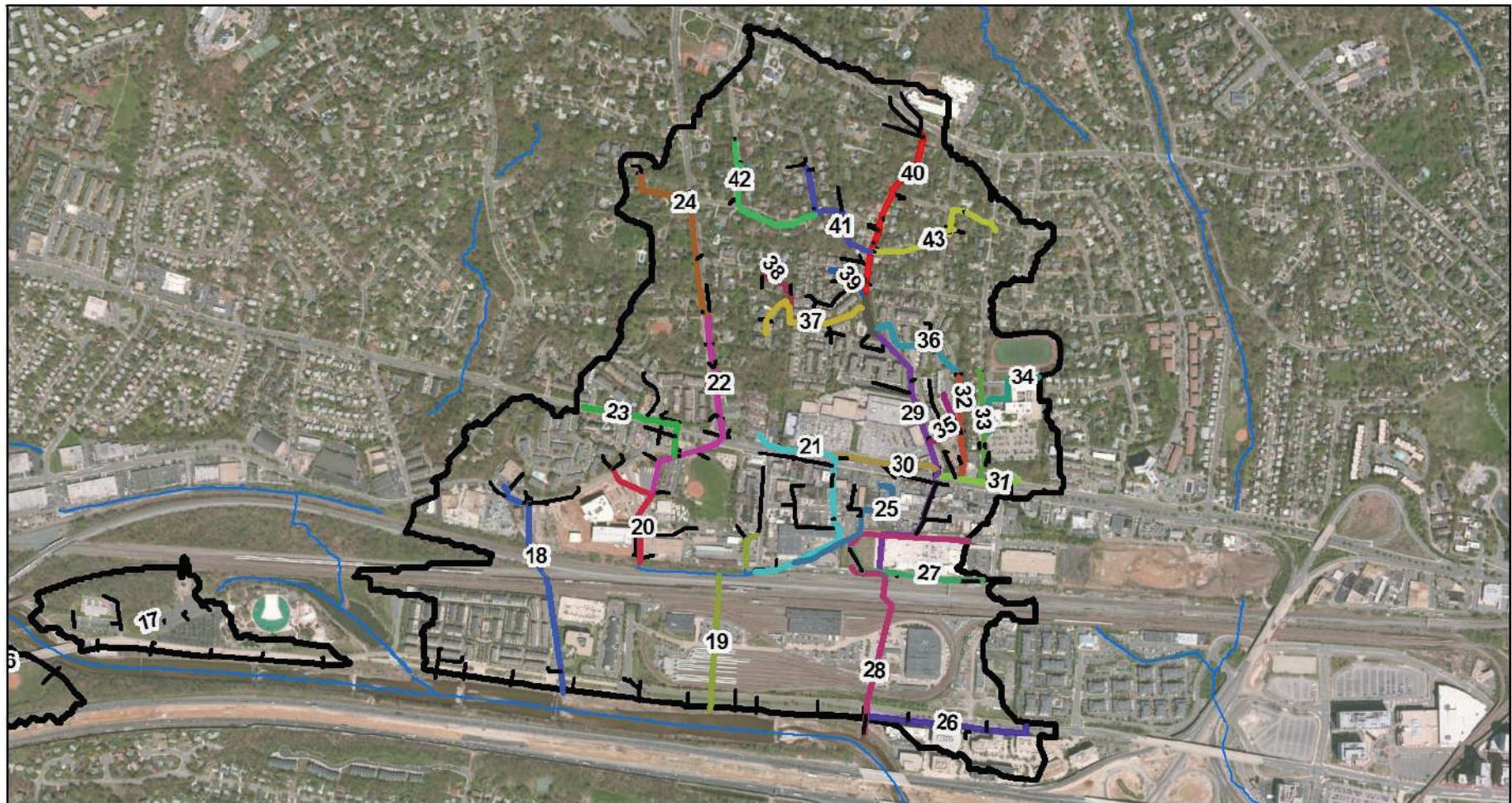
Profile	3	7	11	15
—	—	—	—	—
N/A	4	8	12	16
—	—	—	—	—
1	5	9	13	17
—	—	—	—	—
2	6	10	14	City of Alexandria Streams
Subwatersheds				

Cameron Run West Profile Locations

Cameron Run Watershed Modeling Results

Stormwater Capacity Analysis for Cameron Run Watershed
City of Alexandria, Virginia





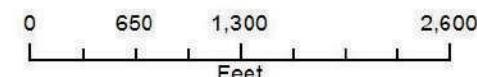
Legend

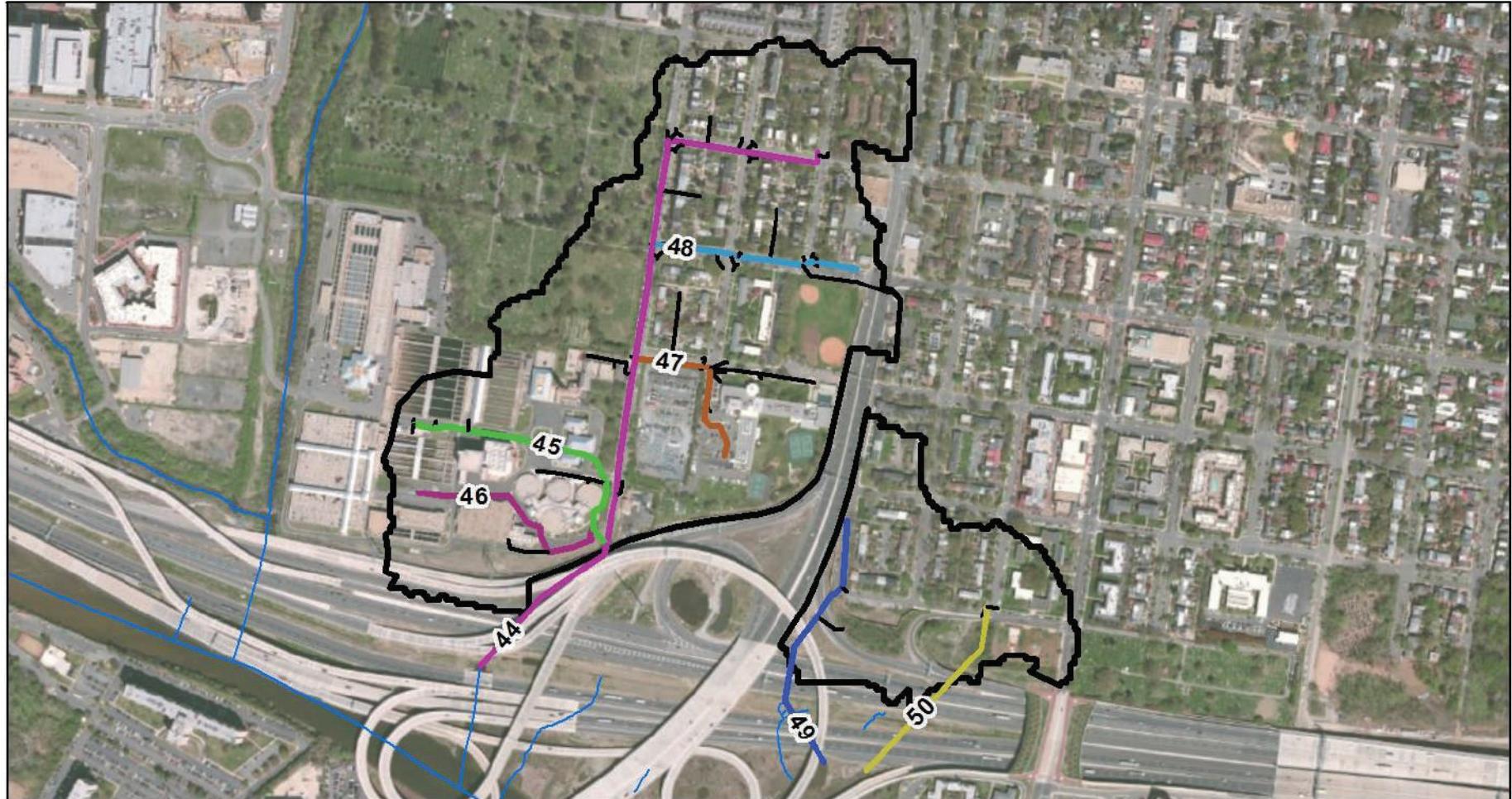
Profile	22	28	34	40
N/A	23	29	35	41
18	24	30	36	42
19	25	31	37	43
20	26	32	38	City of Alexandria Streams
21	27	33	39	Subwatersheds

Cameron Run Center Profile Locations

Cameron Run Watershed Modeling Results

Stormwater Capacity Analysis for Cameron Run Watershed
City of Alexandria, Virginia





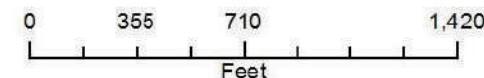
Legend

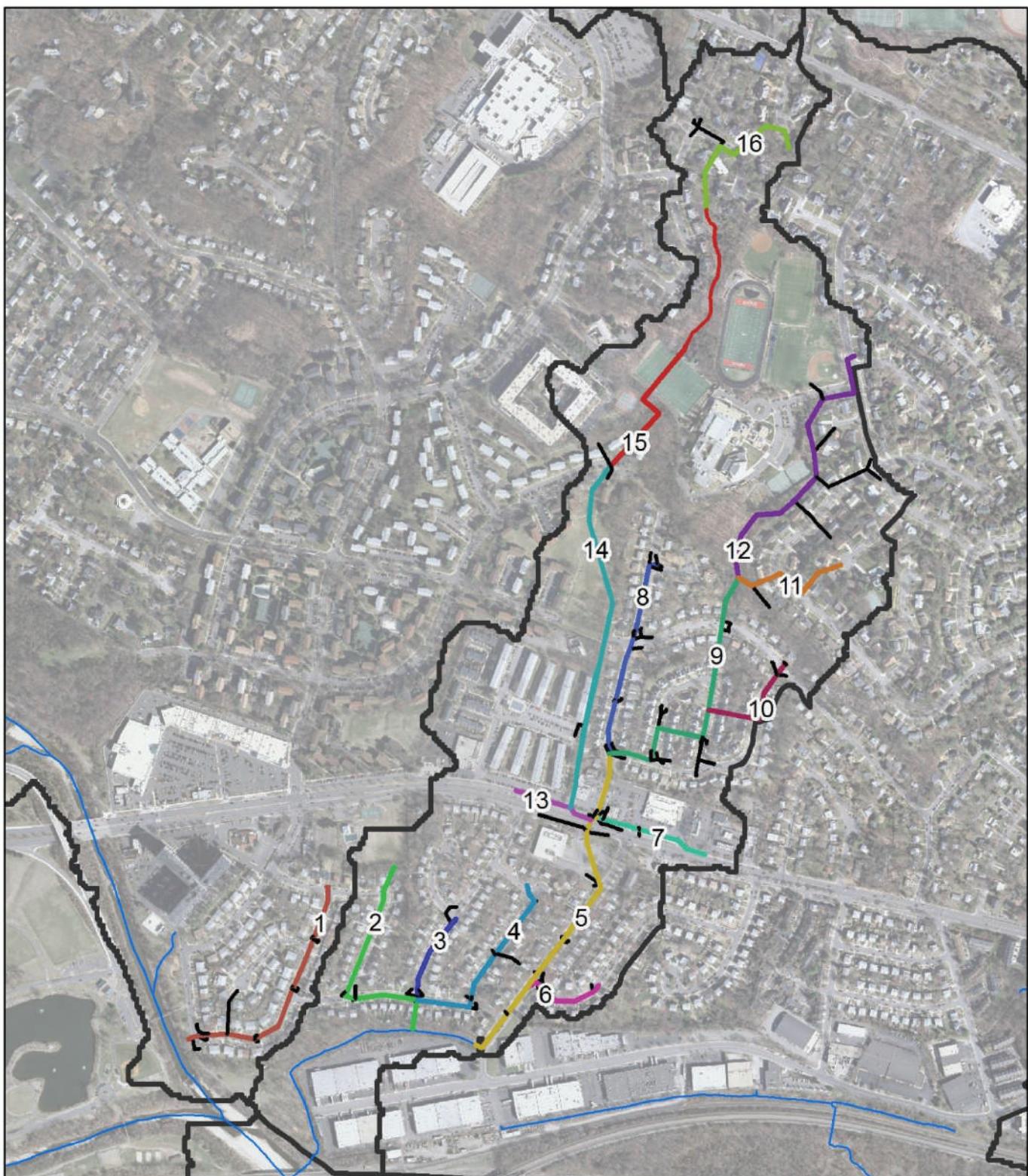
Profile	45	48	City of Alexandria Streams
—	—	—	City of Alexandria Streams
—	—	—	Subwatersheds
N/A	46	49	
—	44	—	47
—	—	—	50

Cameron Run Southeast Profile Locations

Cameron Run Watershed Modeling Results

Stormwater Capacity Analysis for Cameron Run Watershed
City of Alexandria, Virginia





Legend

Profile	3	7	11	15
N/A	4	8	12	16
1	5	9	13	City of Alexandria Streams
2	6	10	14	Watersheds

Cameron Run Profile Locations (North)

Cameron Run Watershed Modeling Results
Stormwater Capacity Analysis for Cameron Run
Watershed, City of Alexandria, Virginia

0 500 1,000 2,000
Feet

CH2MHILL Baker

FIGURE 1

Cameron Run West - Profile 1 from 000408ND to Node5163

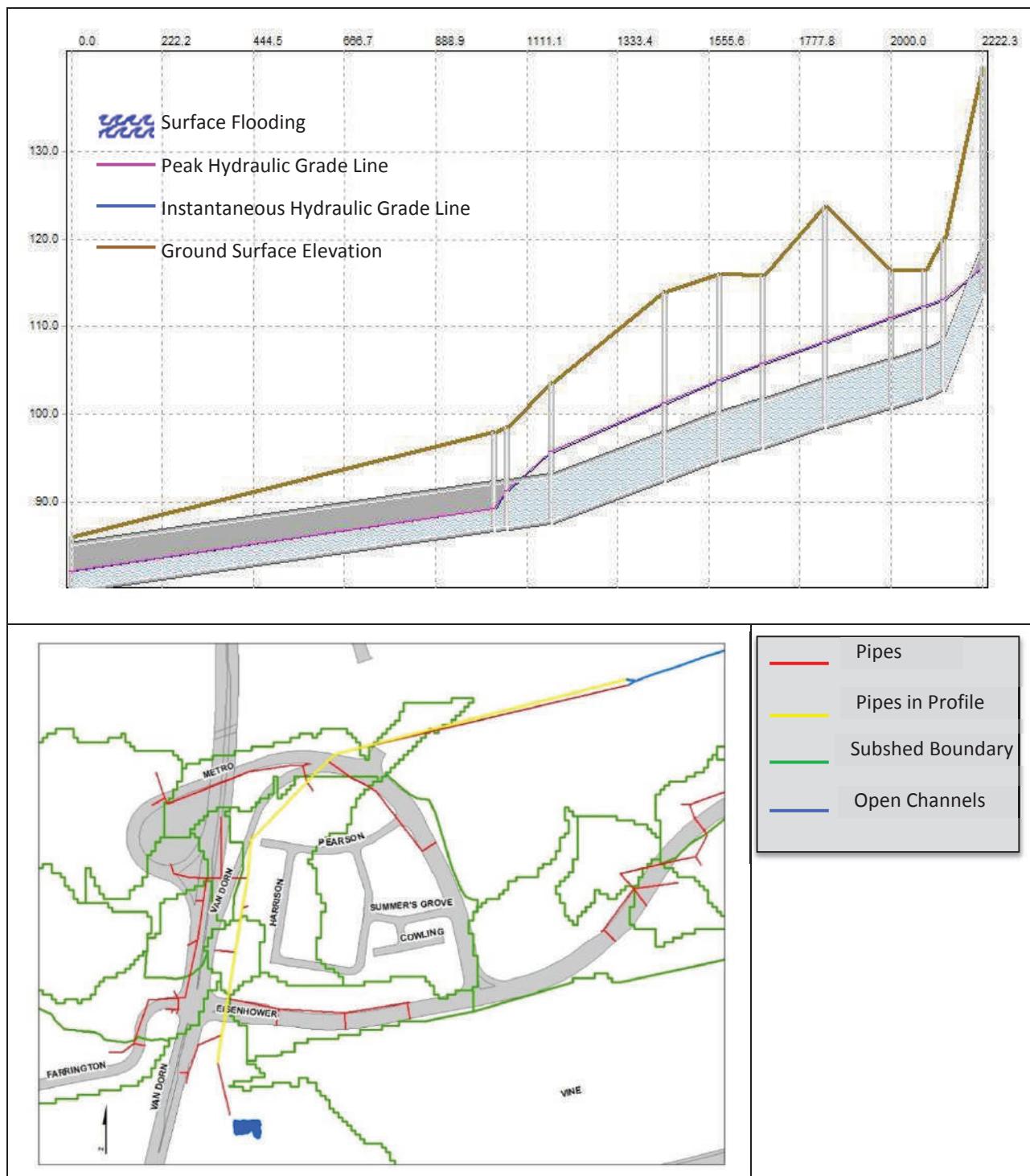


FIGURE 2

Cameron Run West - Profile 2 from 003119IN to 001035SMH

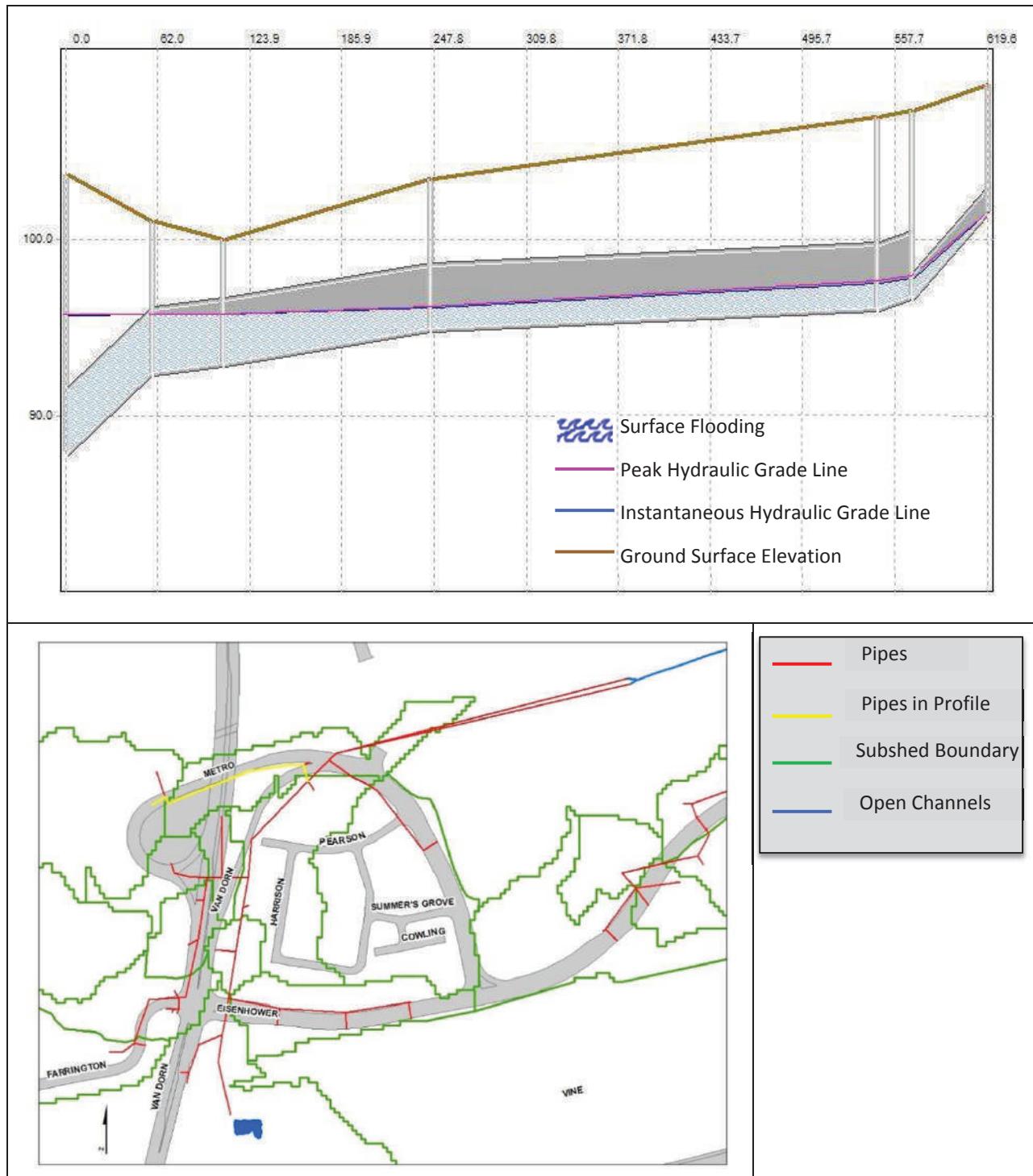


FIGURE 3

Cameron Run West - Profile 3 from 003387IN to 001036SMH

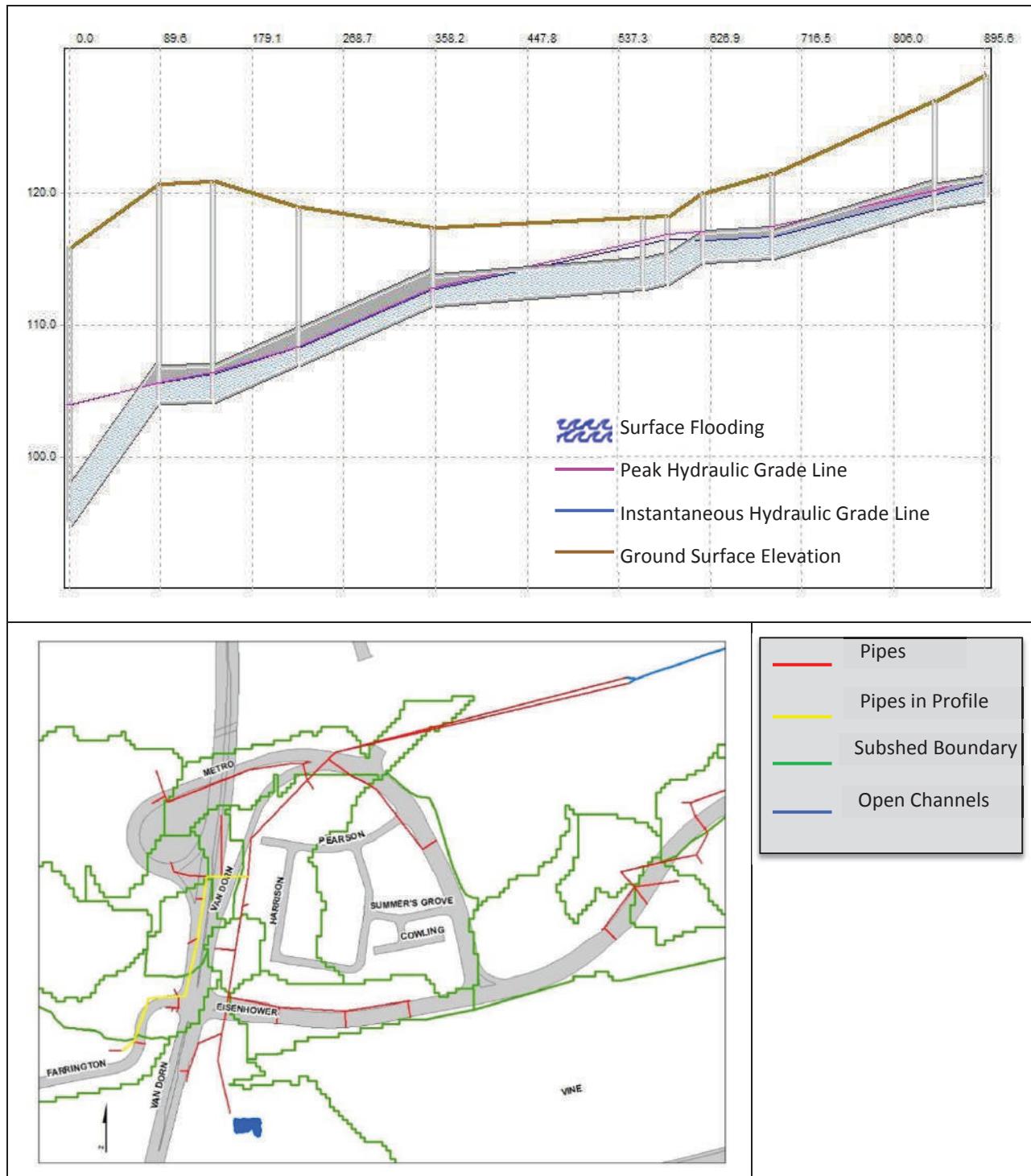


FIGURE 4

Cameron Run West - Profile 4 from 003414IN to 000370ND

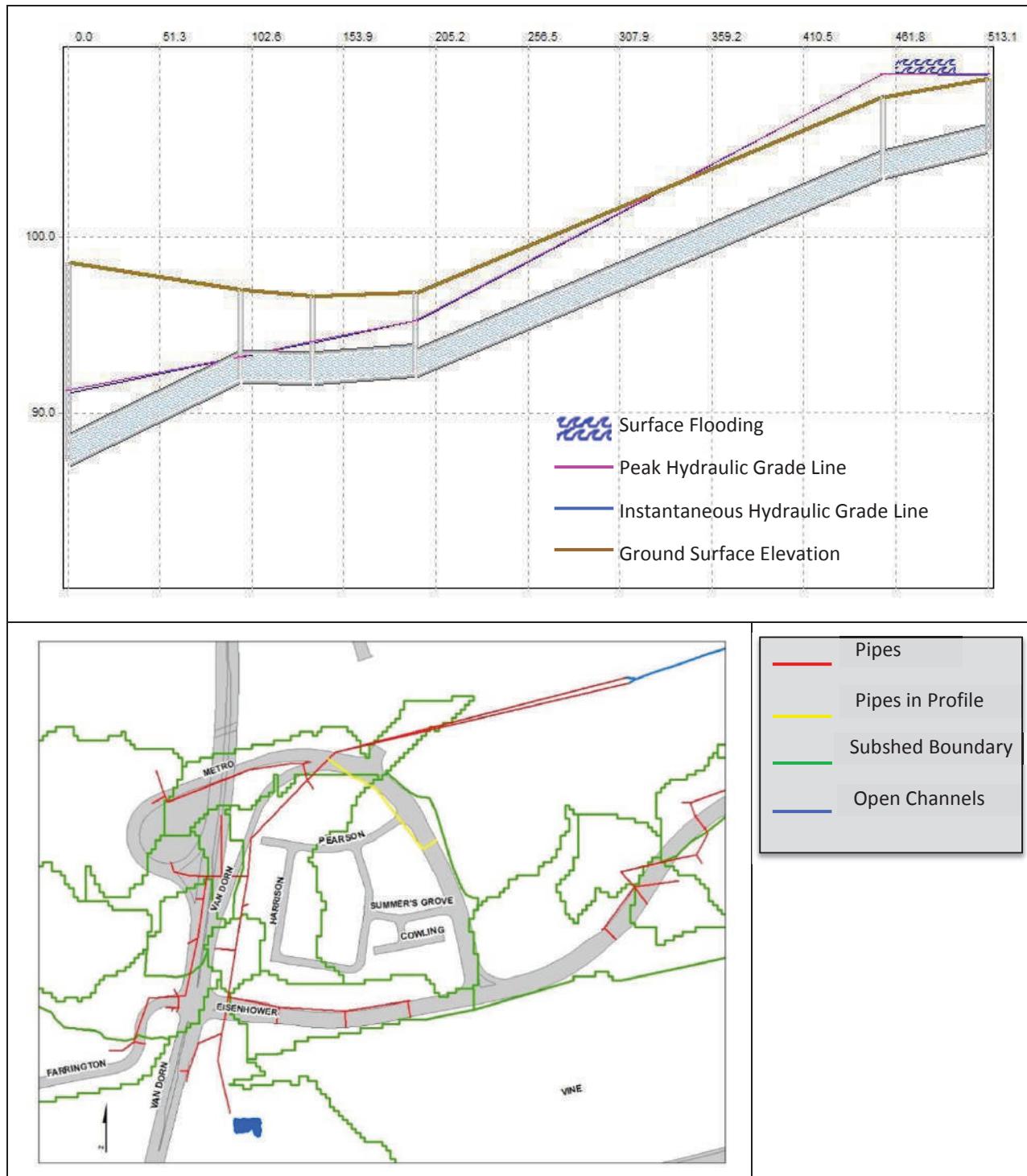


FIGURE 5

Cameron Run West - Profile 5 from 003409IN to 003402IN

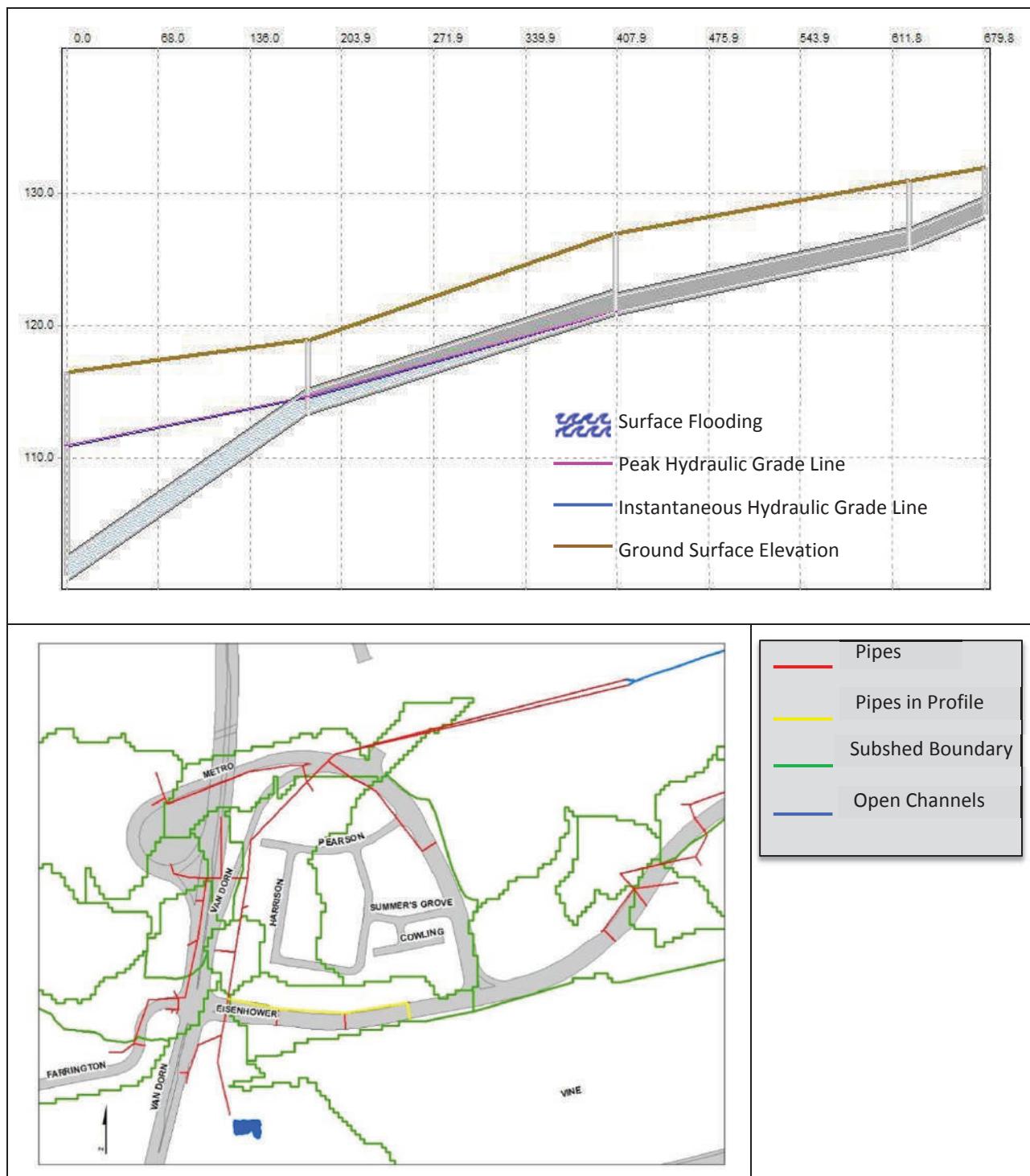


FIGURE 6

Cameron Run West - Profile 6 from 003594IN to 000231IO

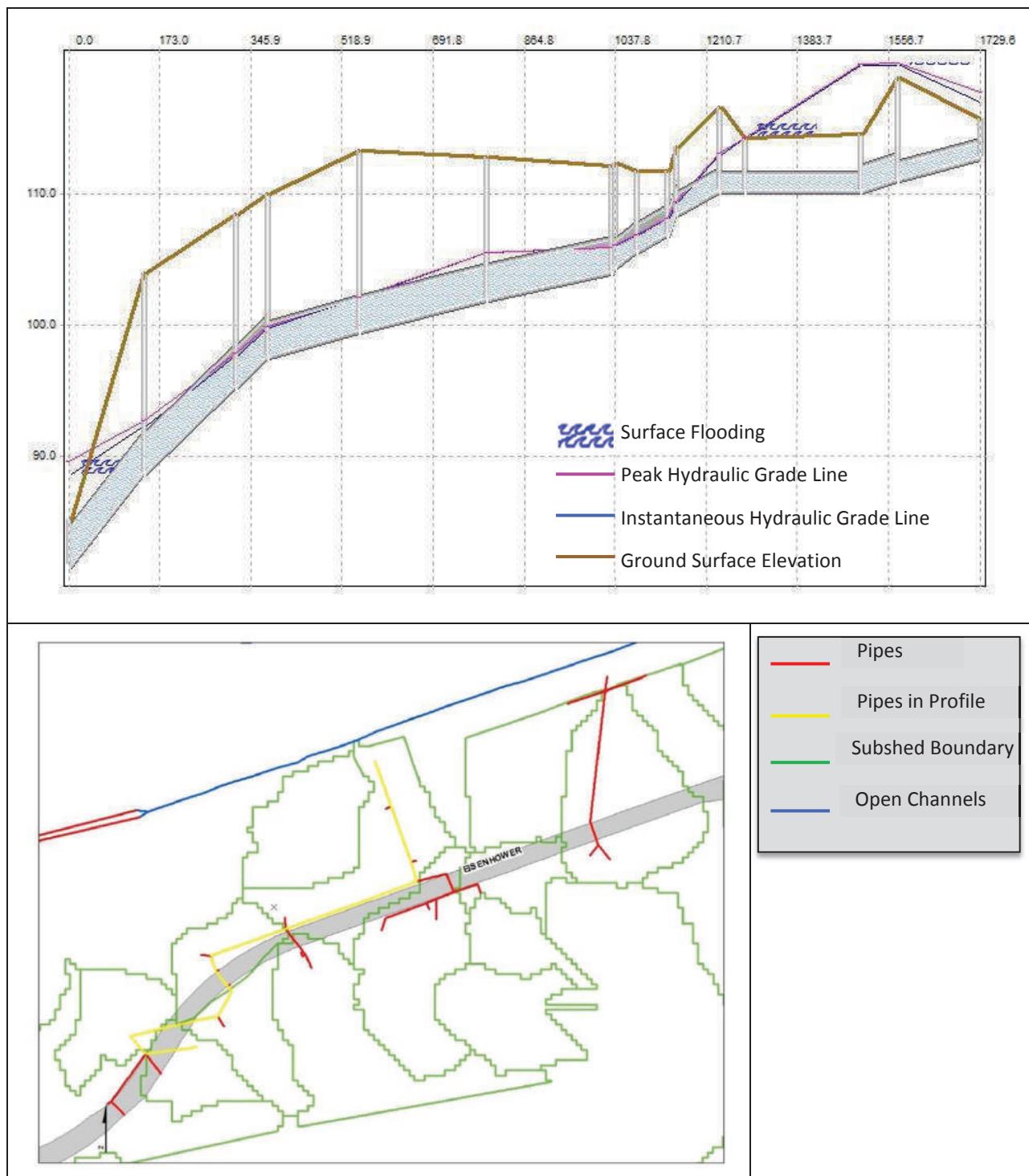


FIGURE 7

Cameron Run West - Profile 7 from 002309ND to 000222IO

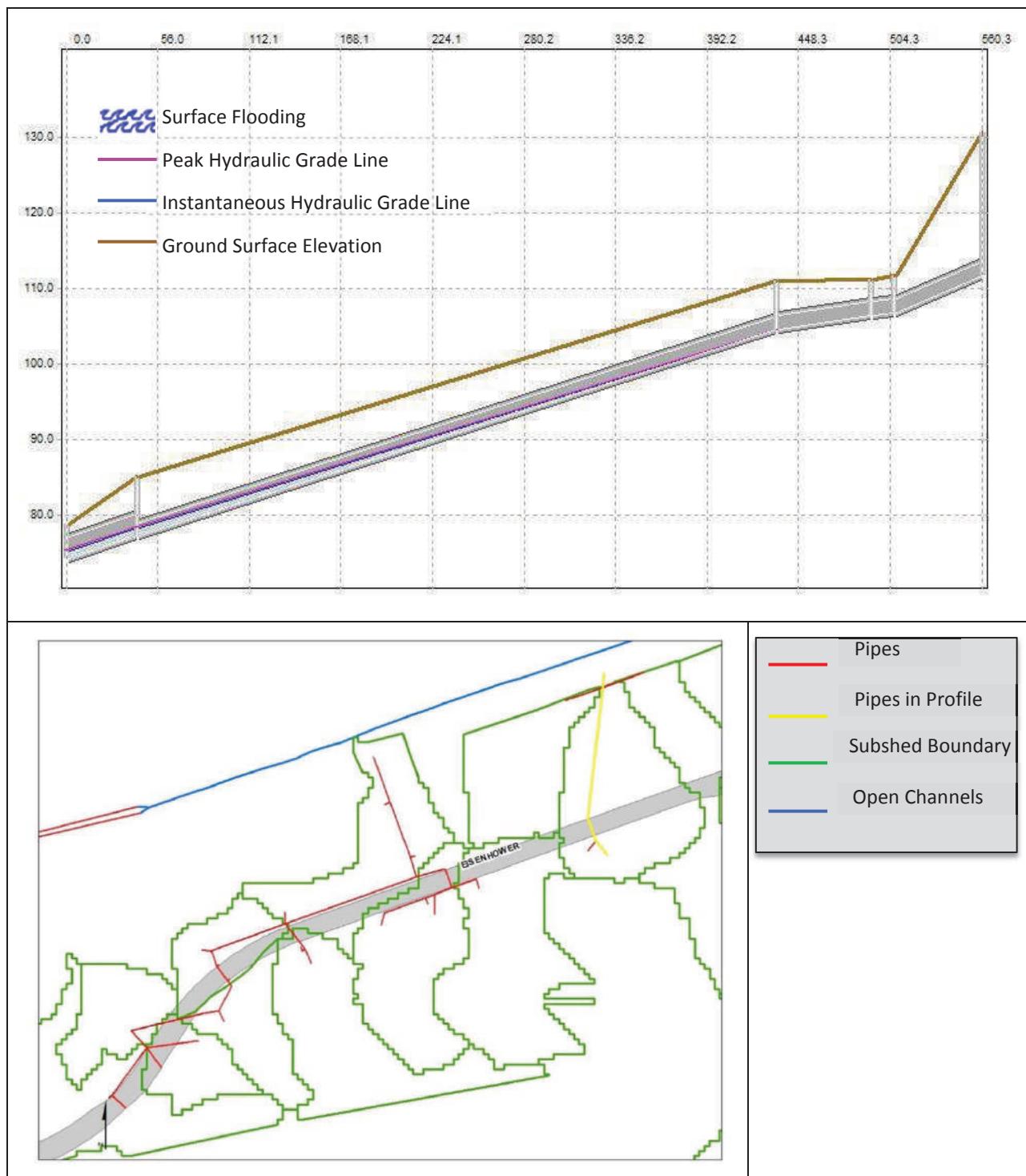


FIGURE 8

Cameron Run West - Profile 8 from 003482IN to 000223IO

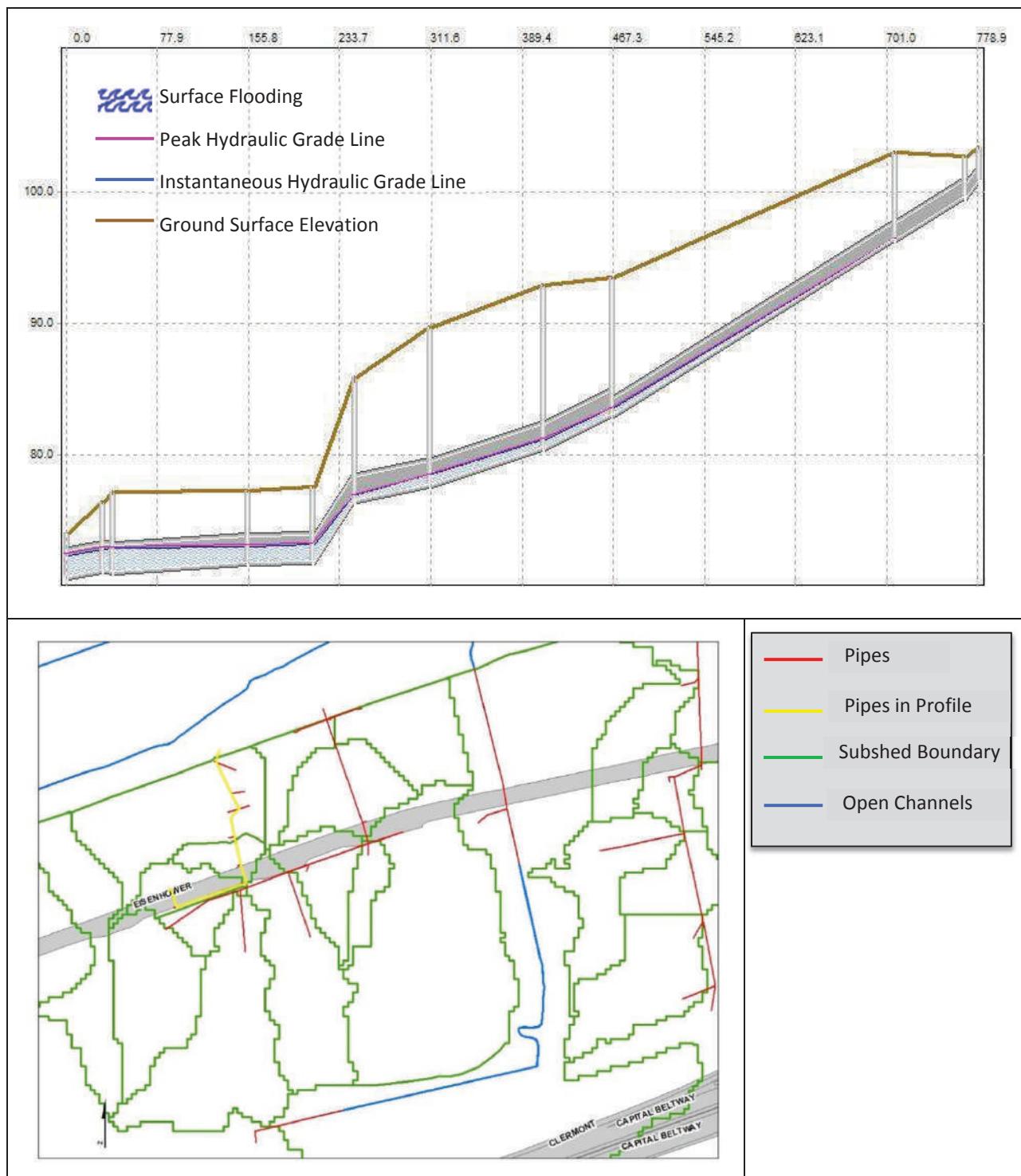


FIGURE 9

Cameron Run West - Profile 9 from 003486IN to 000225IO

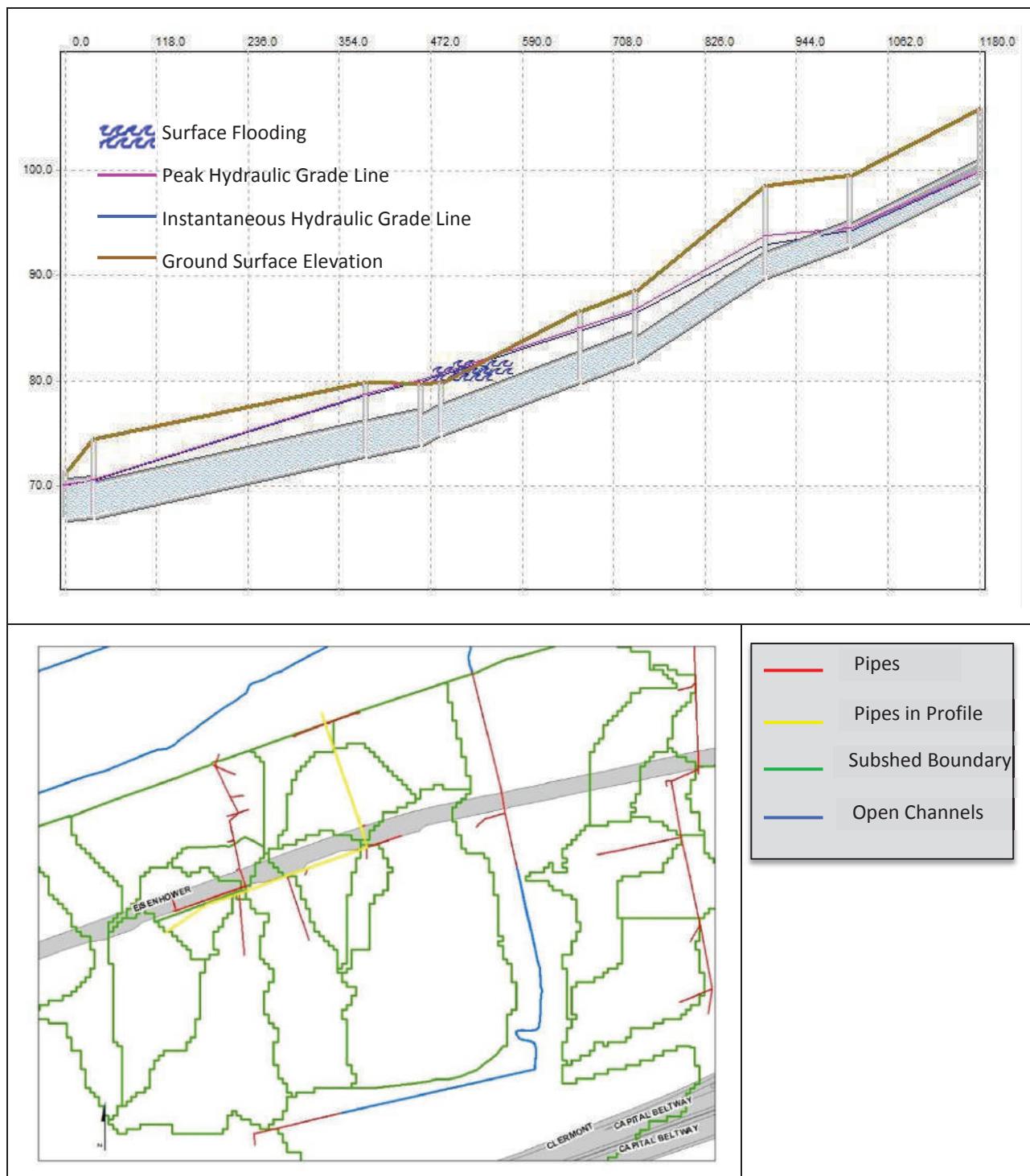


FIGURE 10

Cameron Run West - Profile 10 from 003530IN to 000230IO

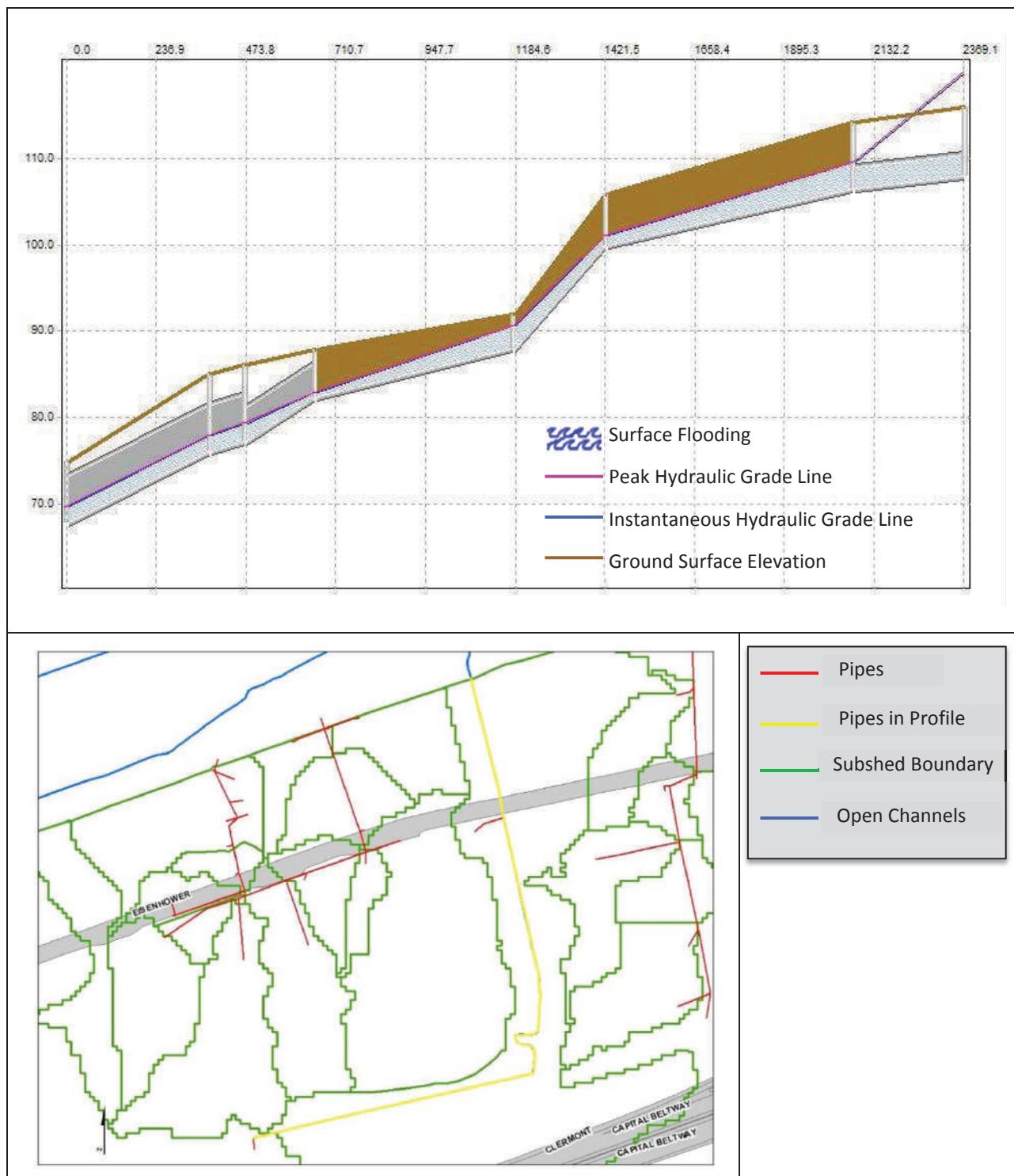


FIGURE 11

Cameron Run West - Profile 11 from 003659IN to 000242IO

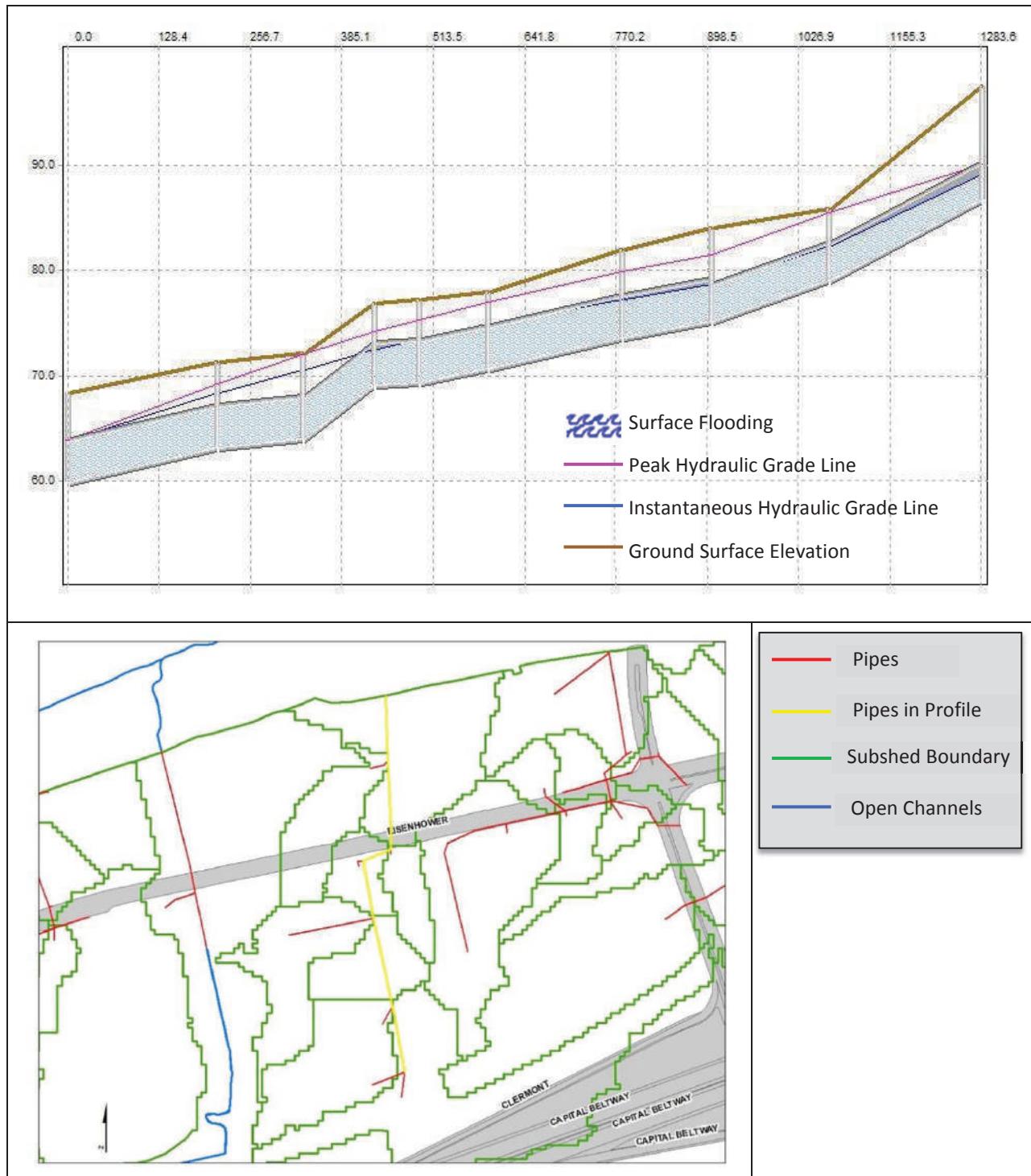


FIGURE 12

Cameron Run West - Profile 12 from 003671IN to 000233IO

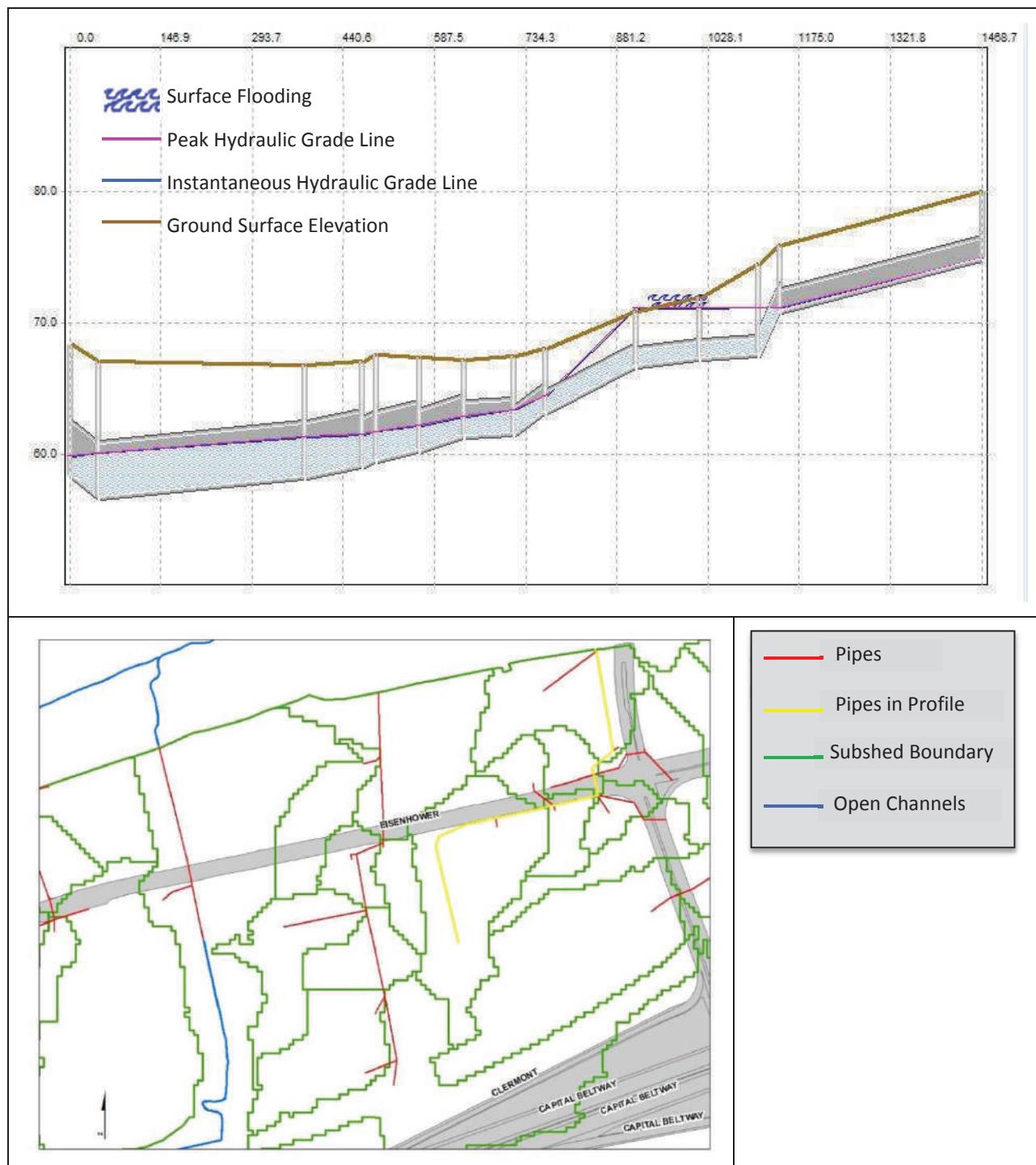


FIGURE 13

Cameron Run West - Profile 13 from 003627IN to 000239IO

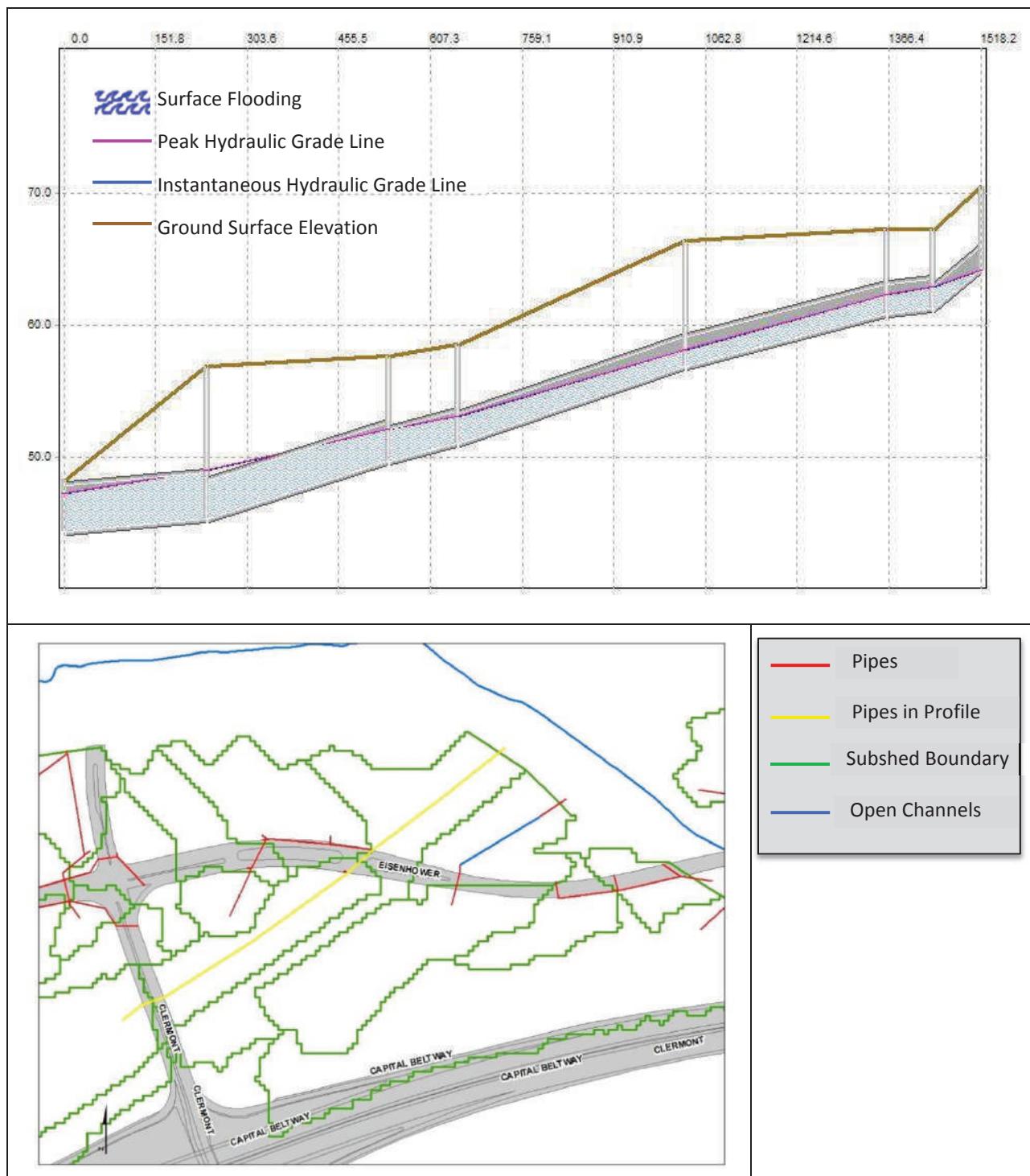


FIGURE 14

Cameron Run West - Profile 14 from 003621IN to 003613IN

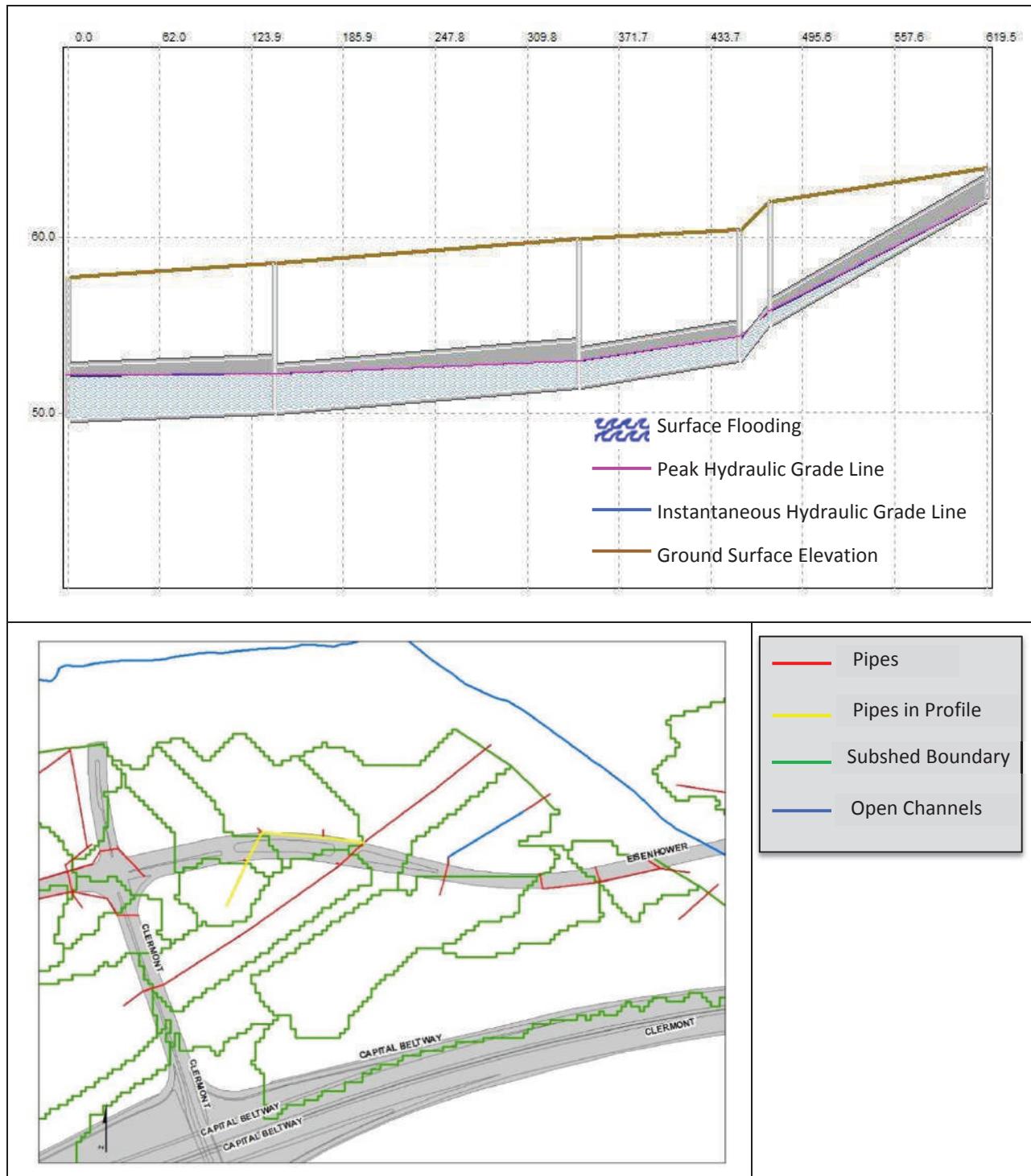


FIGURE 15

Cameron Run West - Profile 15 from 003651IN to 000237IO

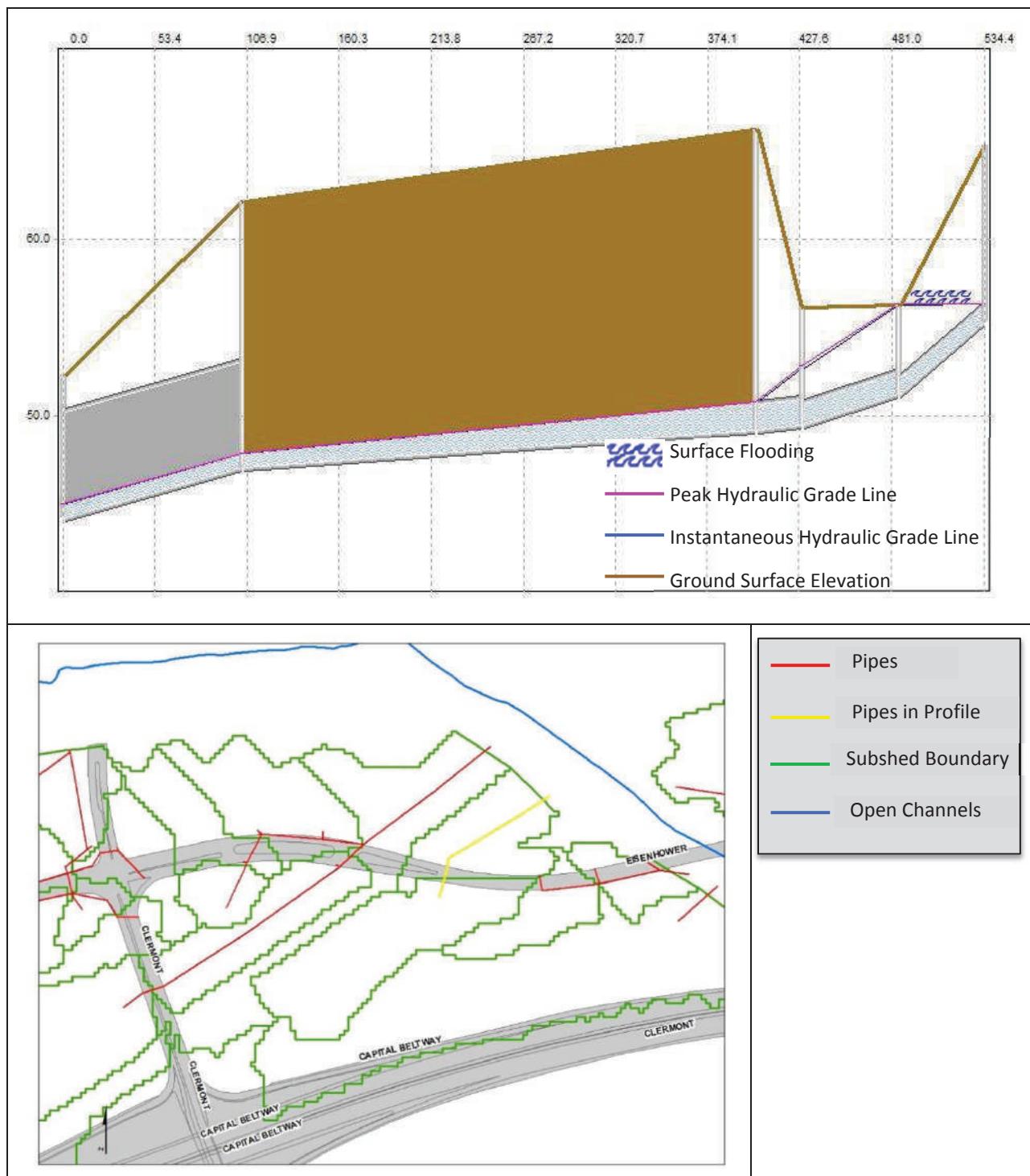


FIGURE 16

Cameron Run West - Profile 16 from 003643IN to 000236IO

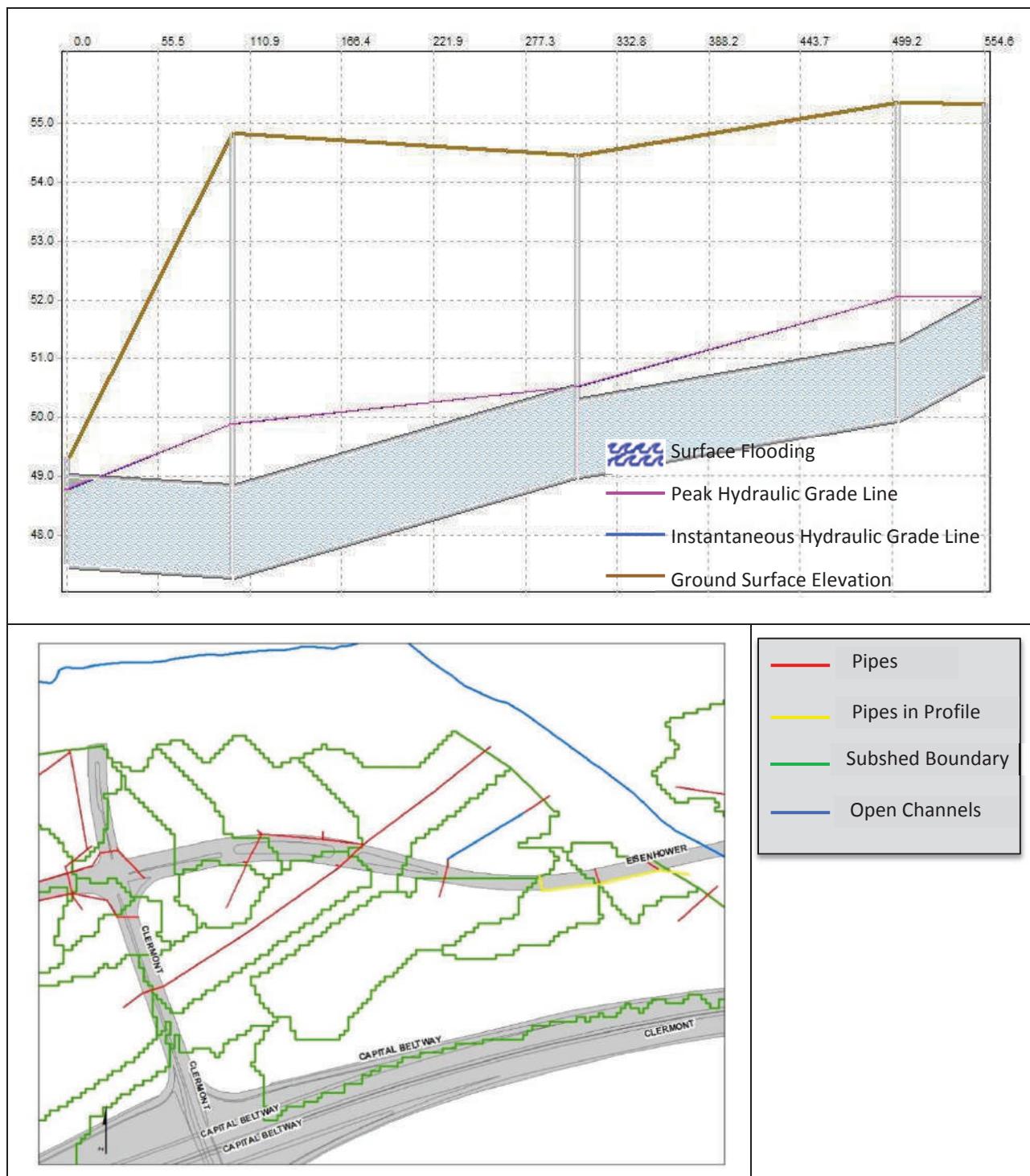


FIGURE 17

Cameron Run West - Profile 17 from 000238IO to 000245IO

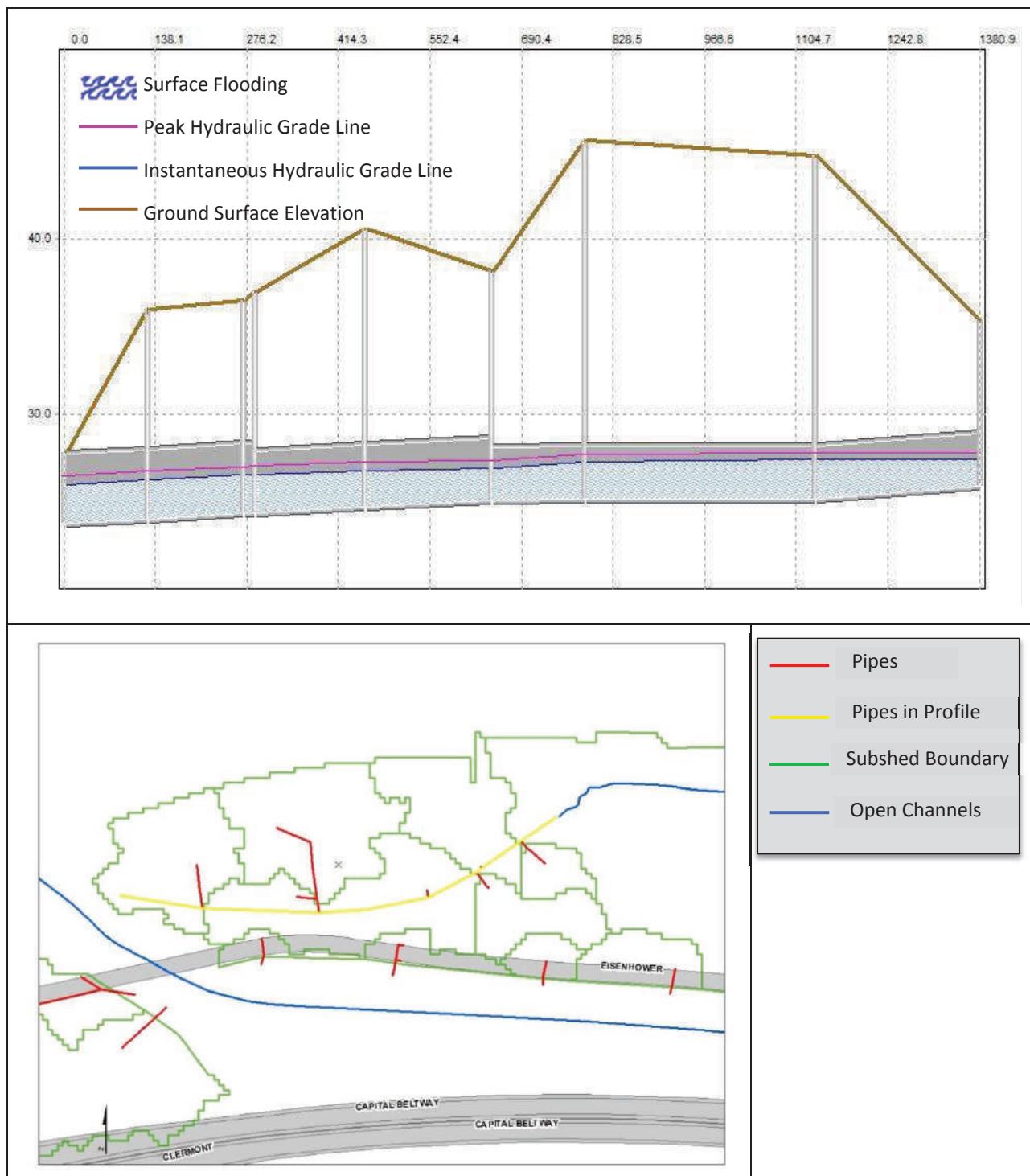


FIGURE 18

Cameron Run Center - Profile 18 from 001849IN to 000065CP

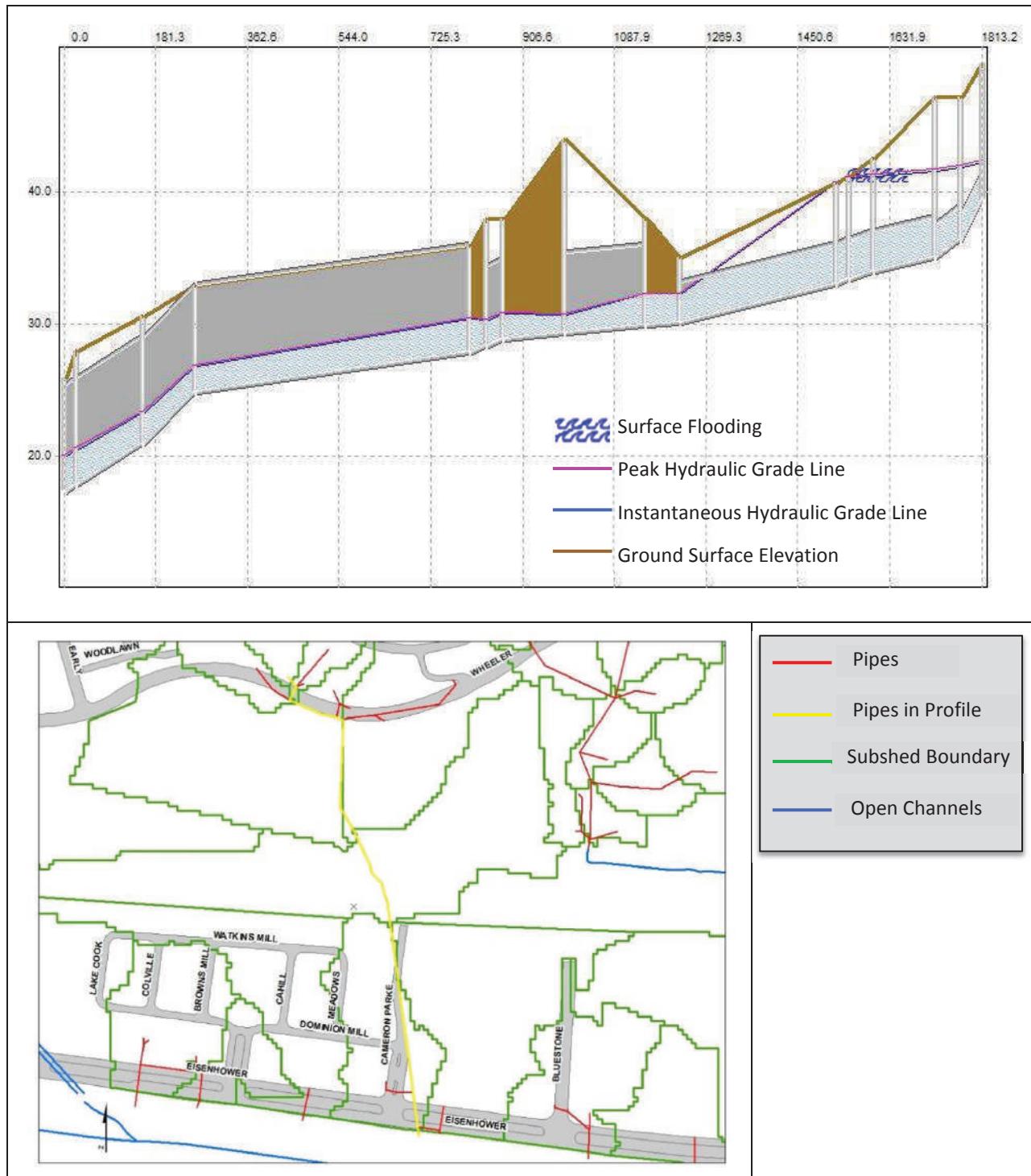


FIGURE 19

Cameron Run Center - Profile 19 from 002451IN to 000258IO

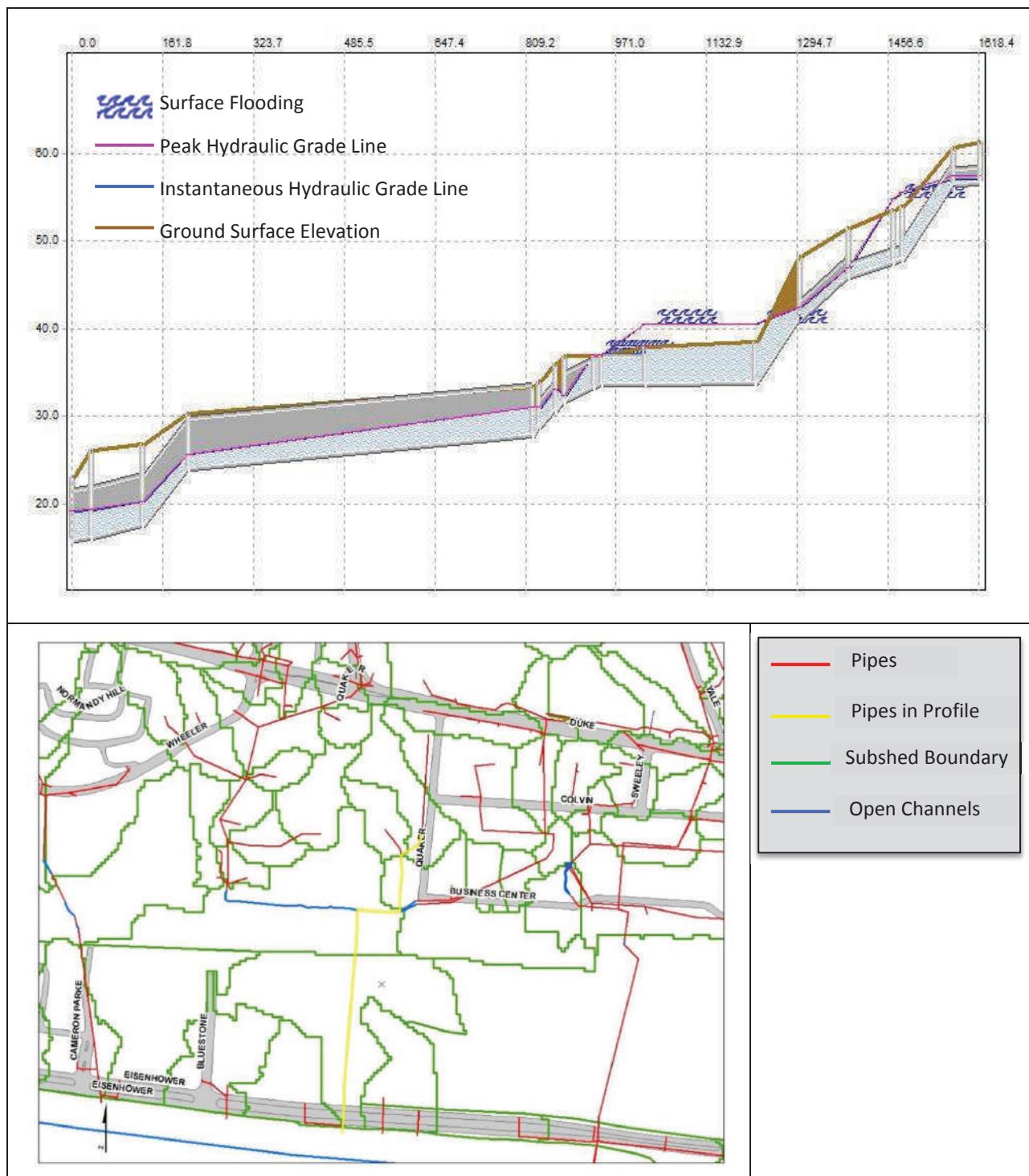


FIGURE 20

Cameron Run Center - Profile 20 from 002501IN to Node5171

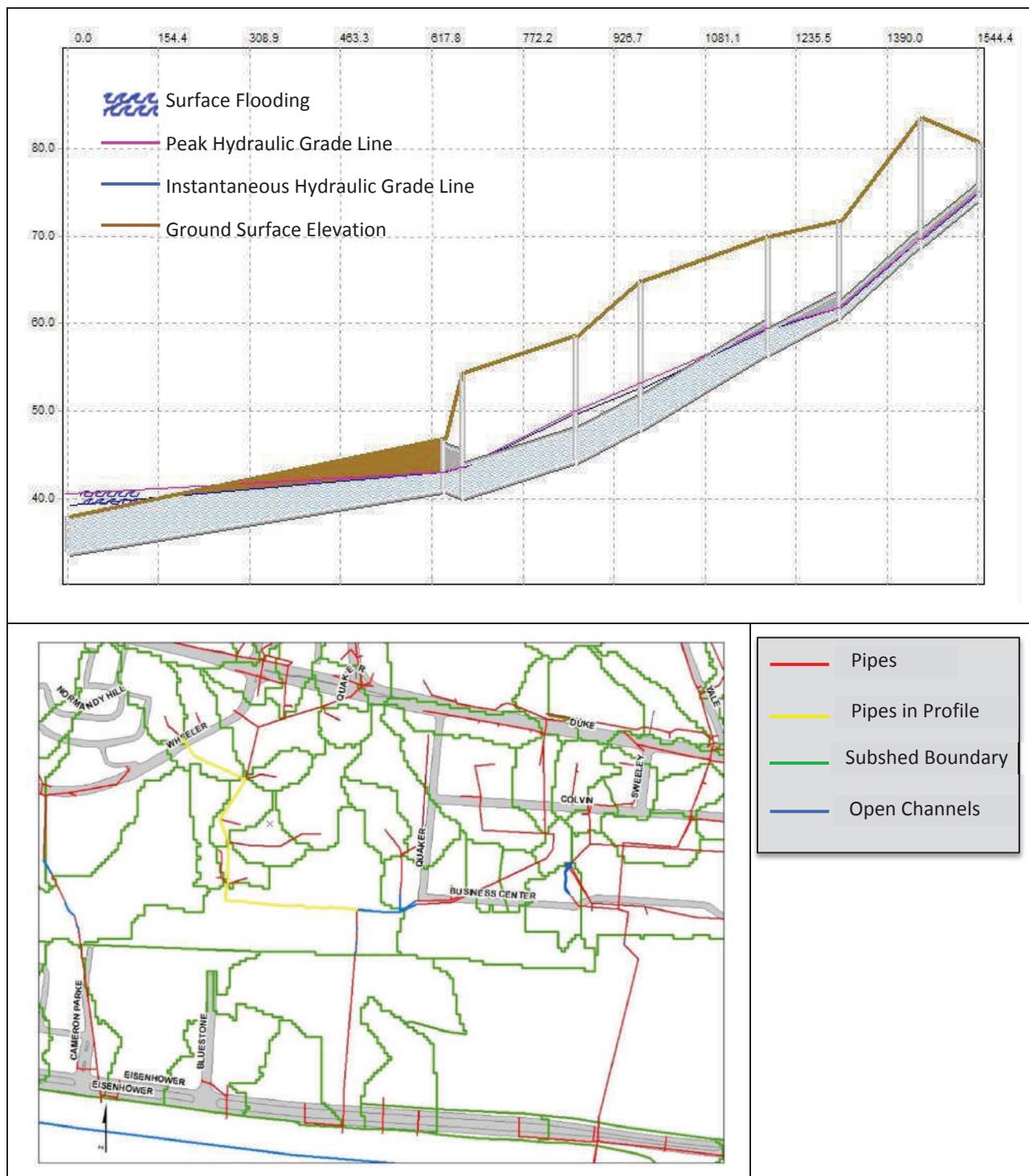


FIGURE 21

Cameron Run Center - Profile 21 from 000319ND to Node5177

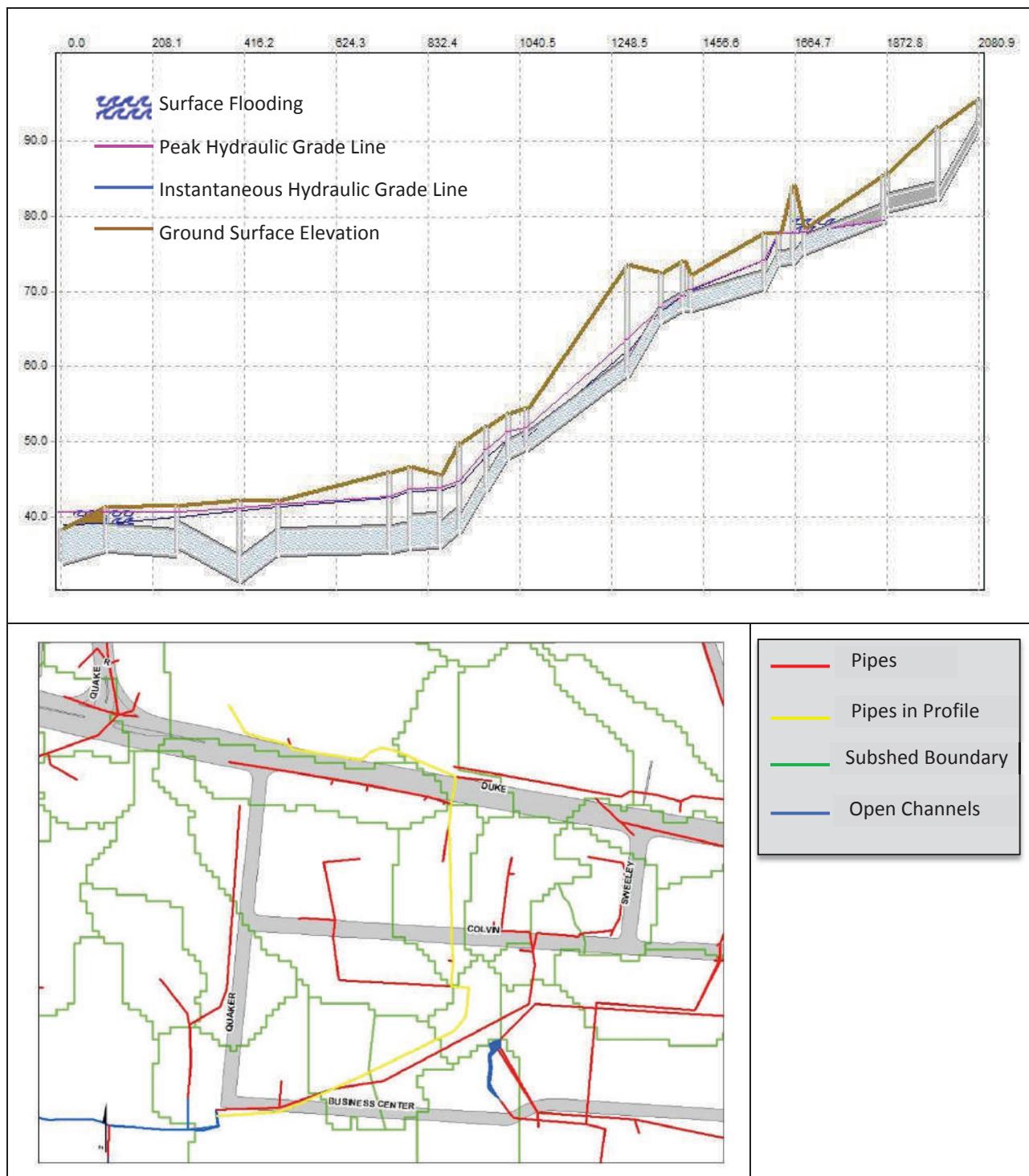


FIGURE 22

Cameron Run Center - Profile 22 from 000850SMH to 002507IN

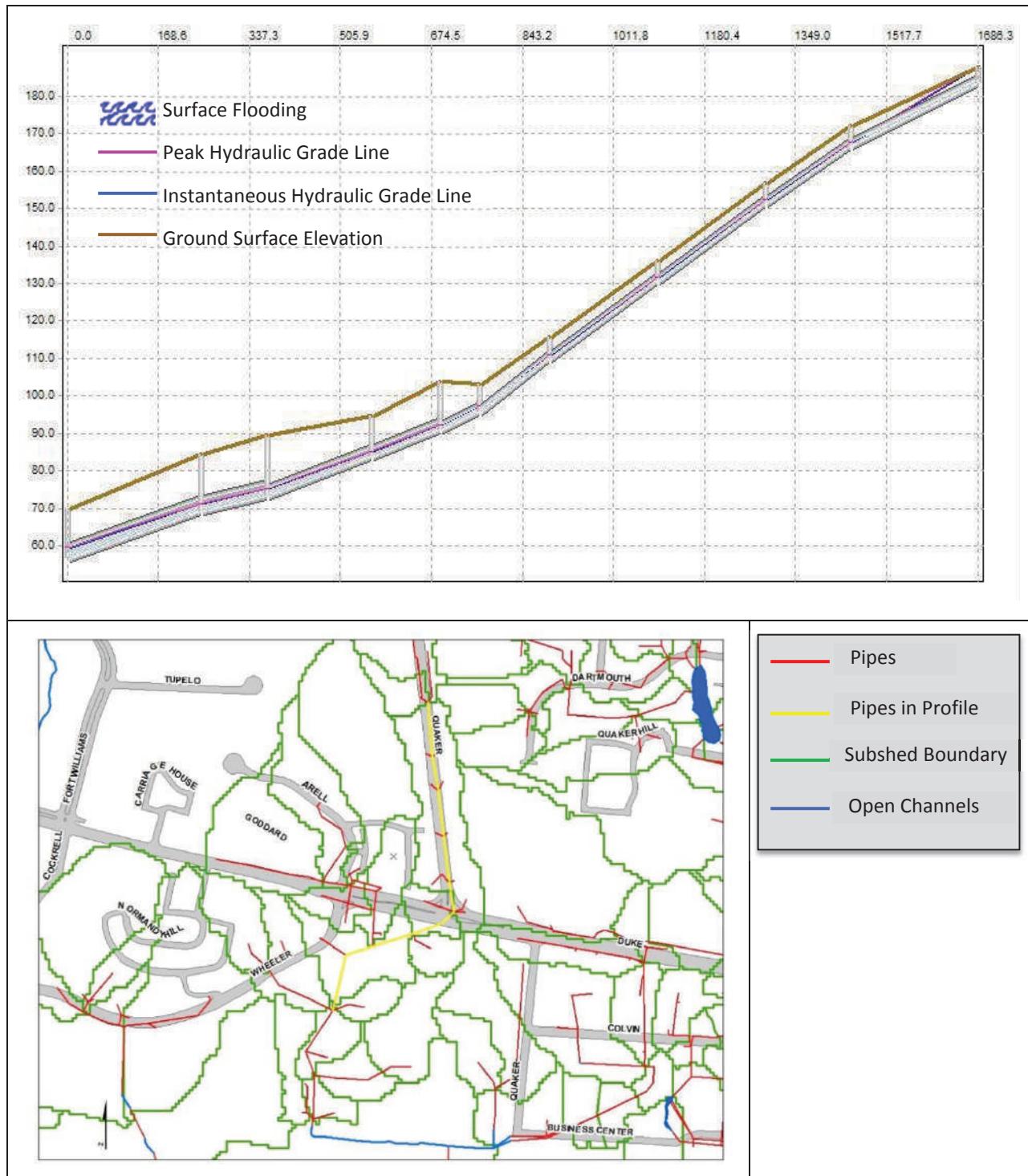


FIGURE 23

Cameron Run Center - Profile 23 from 002333IN to 000857SMH

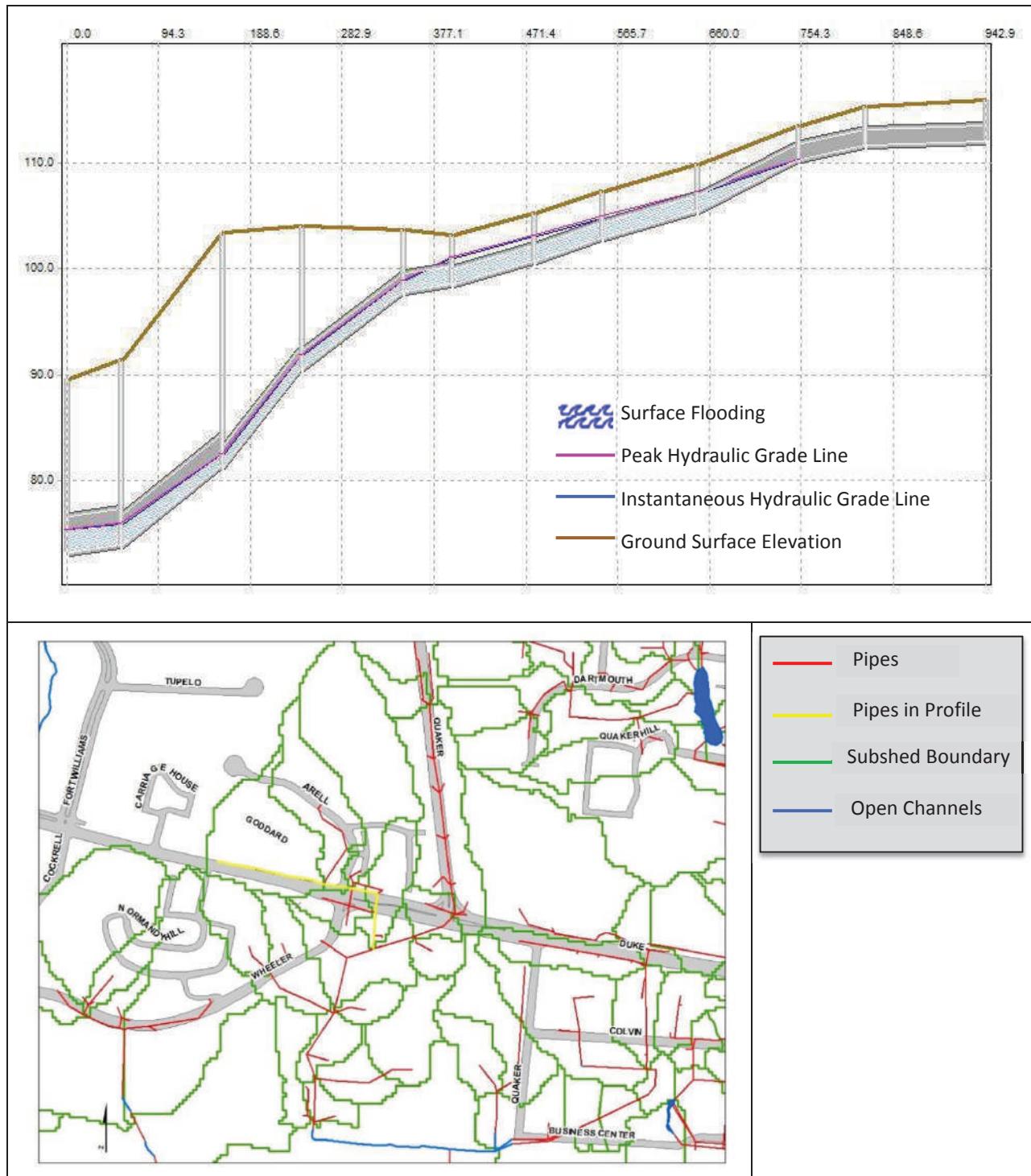


FIGURE 24

Cameron Run Center - Profile 24 from 001258IN to 000850SMH

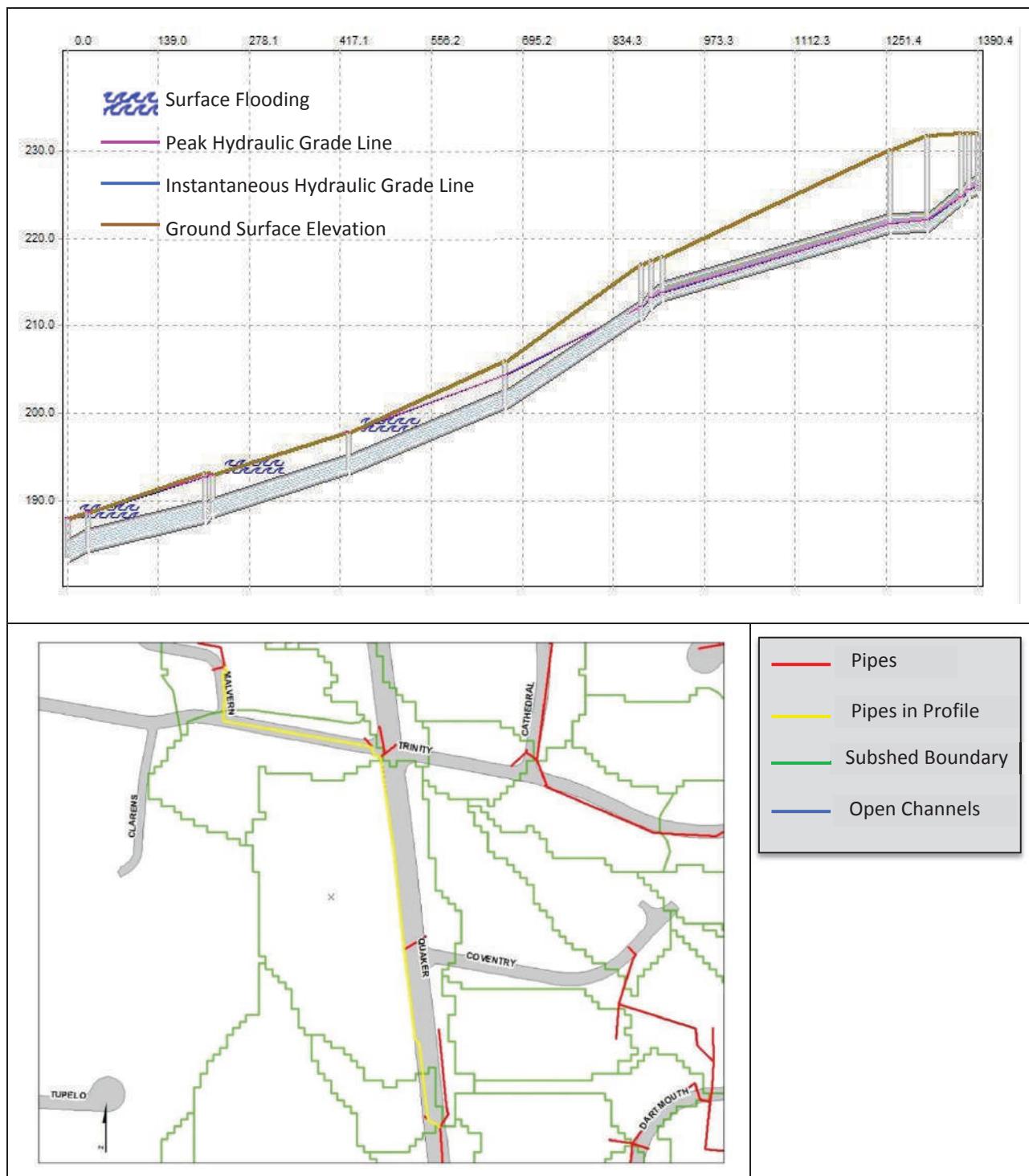


FIGURE 25

Cameron Run Center - Profile 25 from 002439IN to 000849SMH

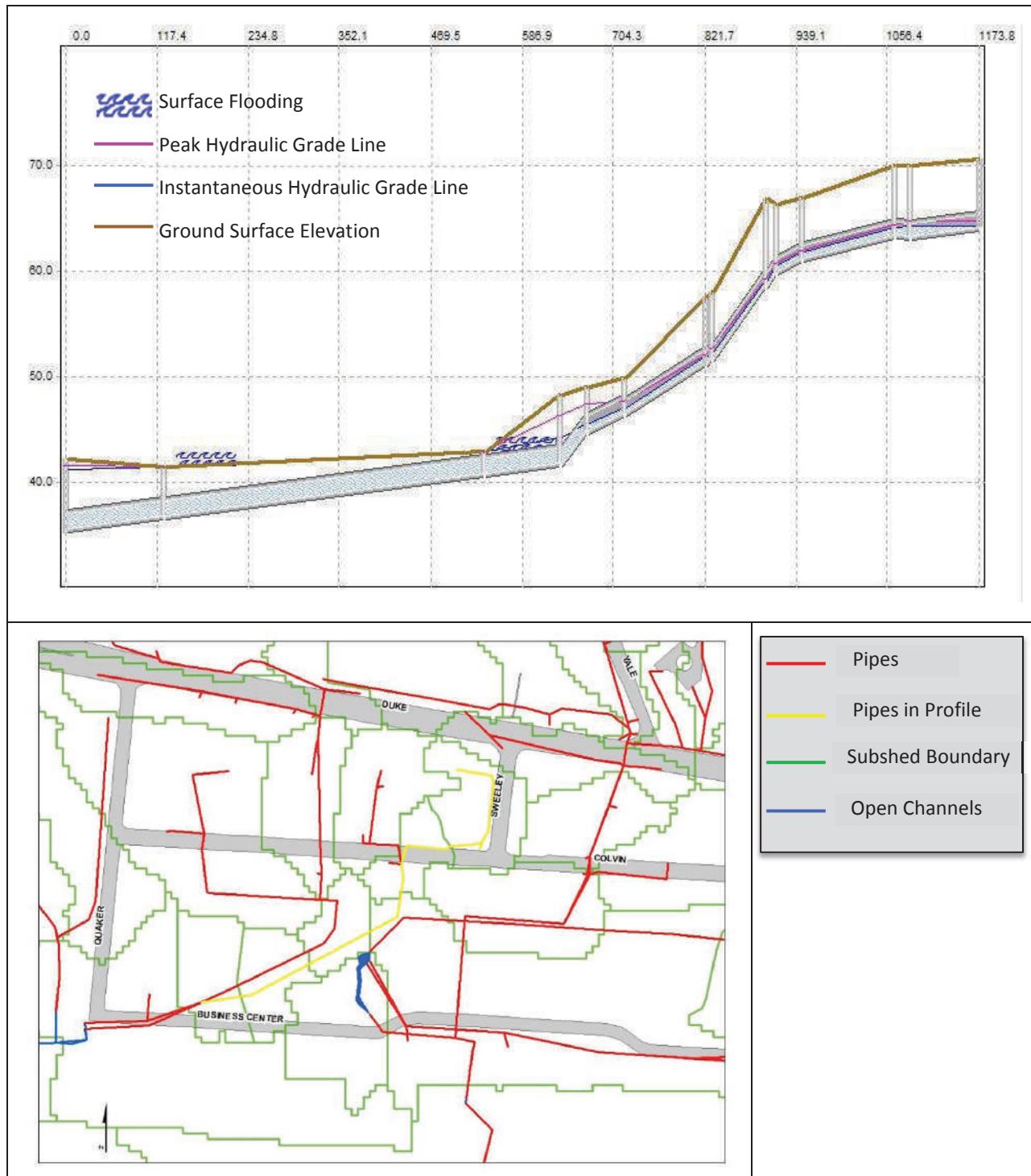


FIGURE 26

Cameron Run Center - Profile 26 from 003796IN to 001215SMH

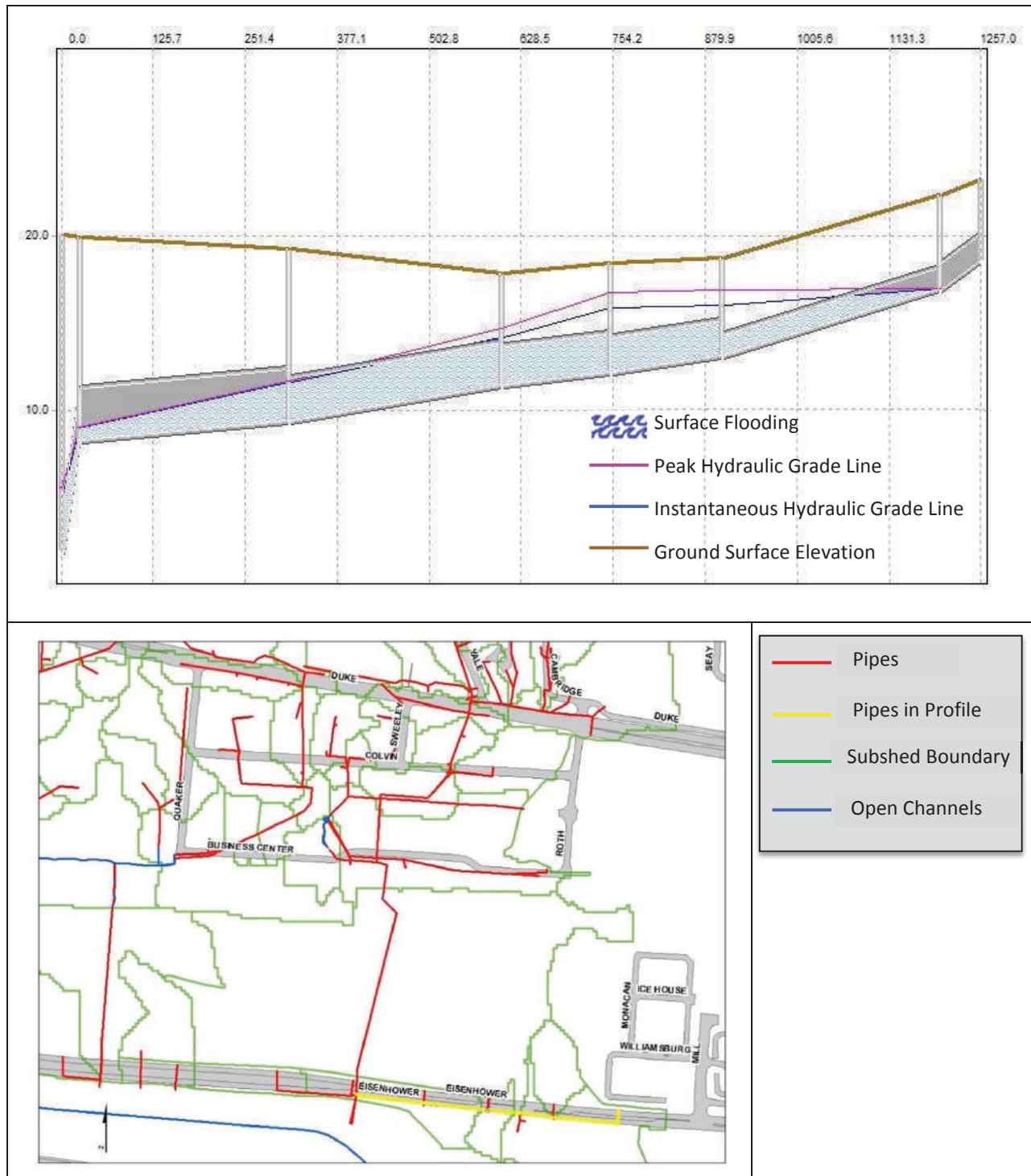


FIGURE 27

Cameron Run Center - Profile 27 from 003540SMH to 003542SMH

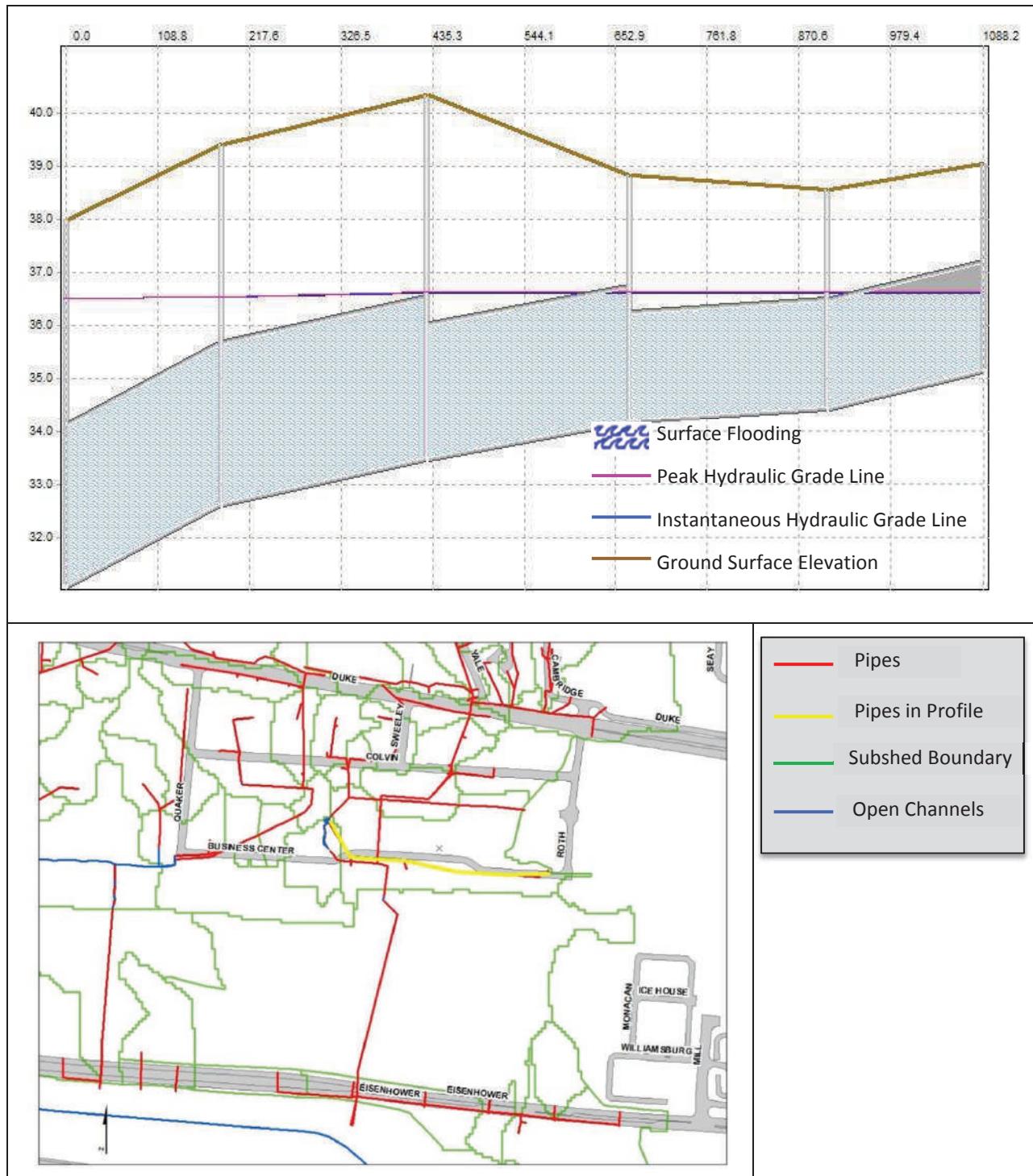


FIGURE 28

Cameron Run Center - Profile 28 from 004127SMH to 000612IO

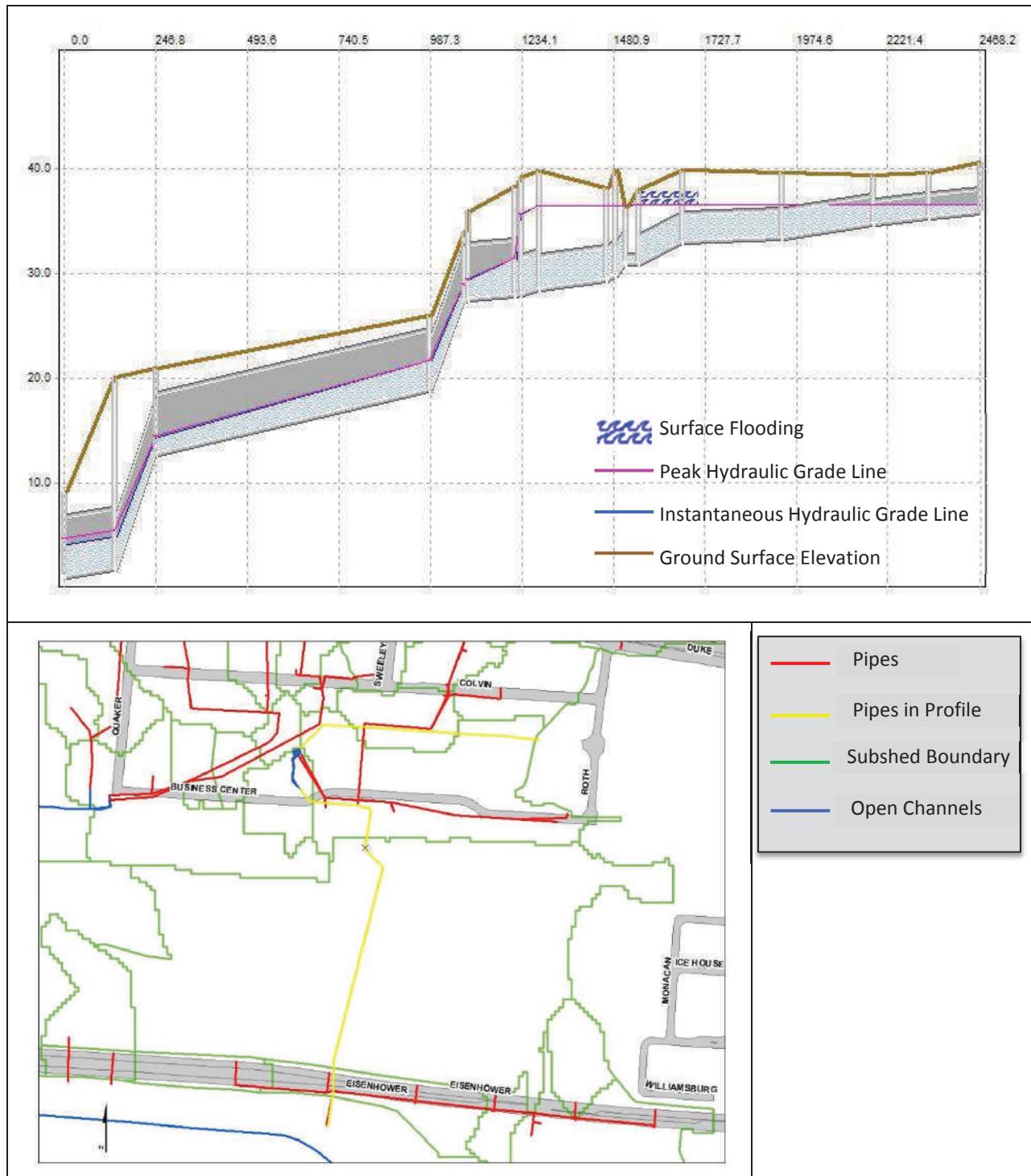


FIGURE 29

Cameron Run Center - Profile 29 from 000170IO to 003546SMH

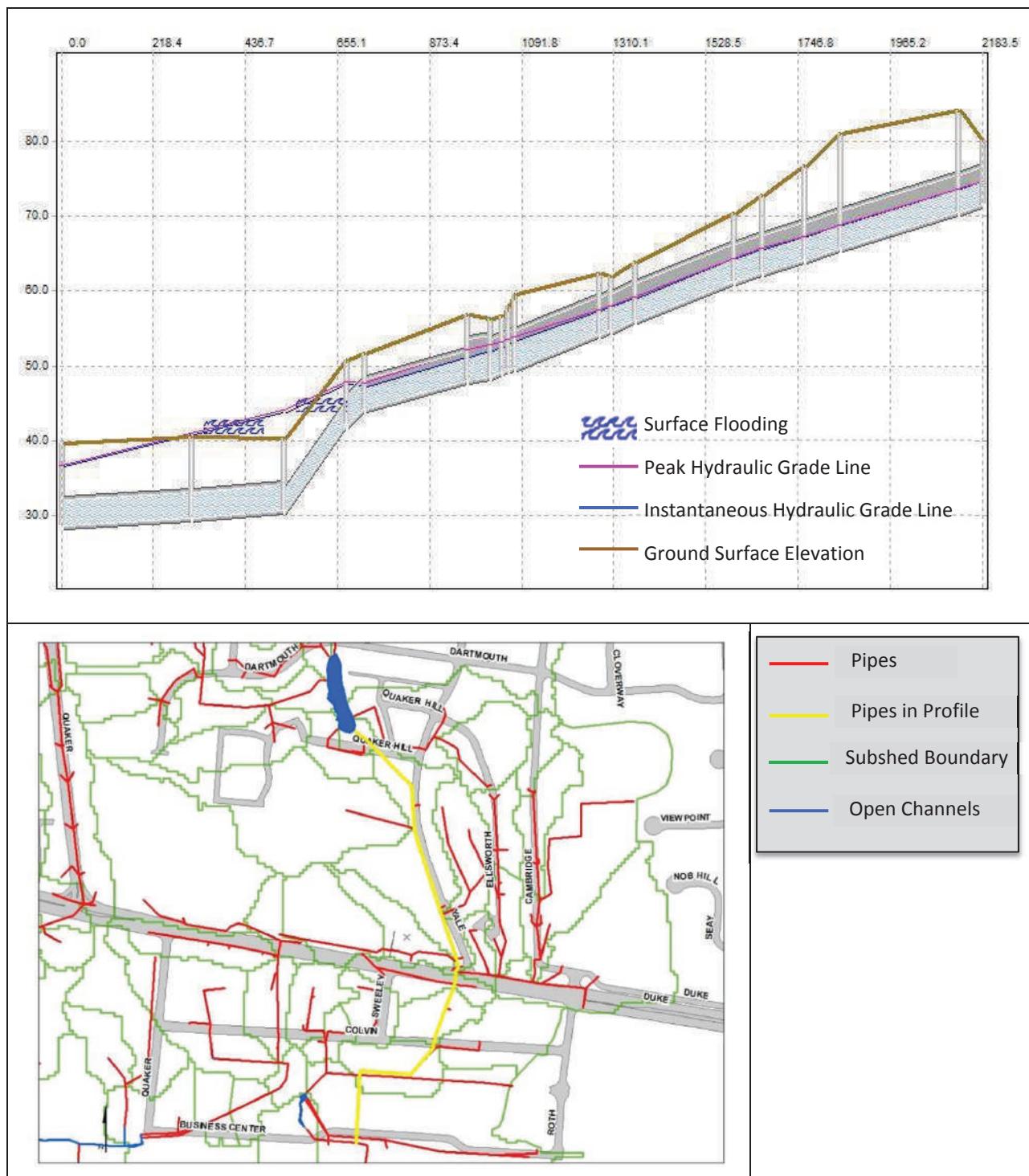


FIGURE 30

Cameron Run Center - Profile 30 from 002469IN to 000298ND

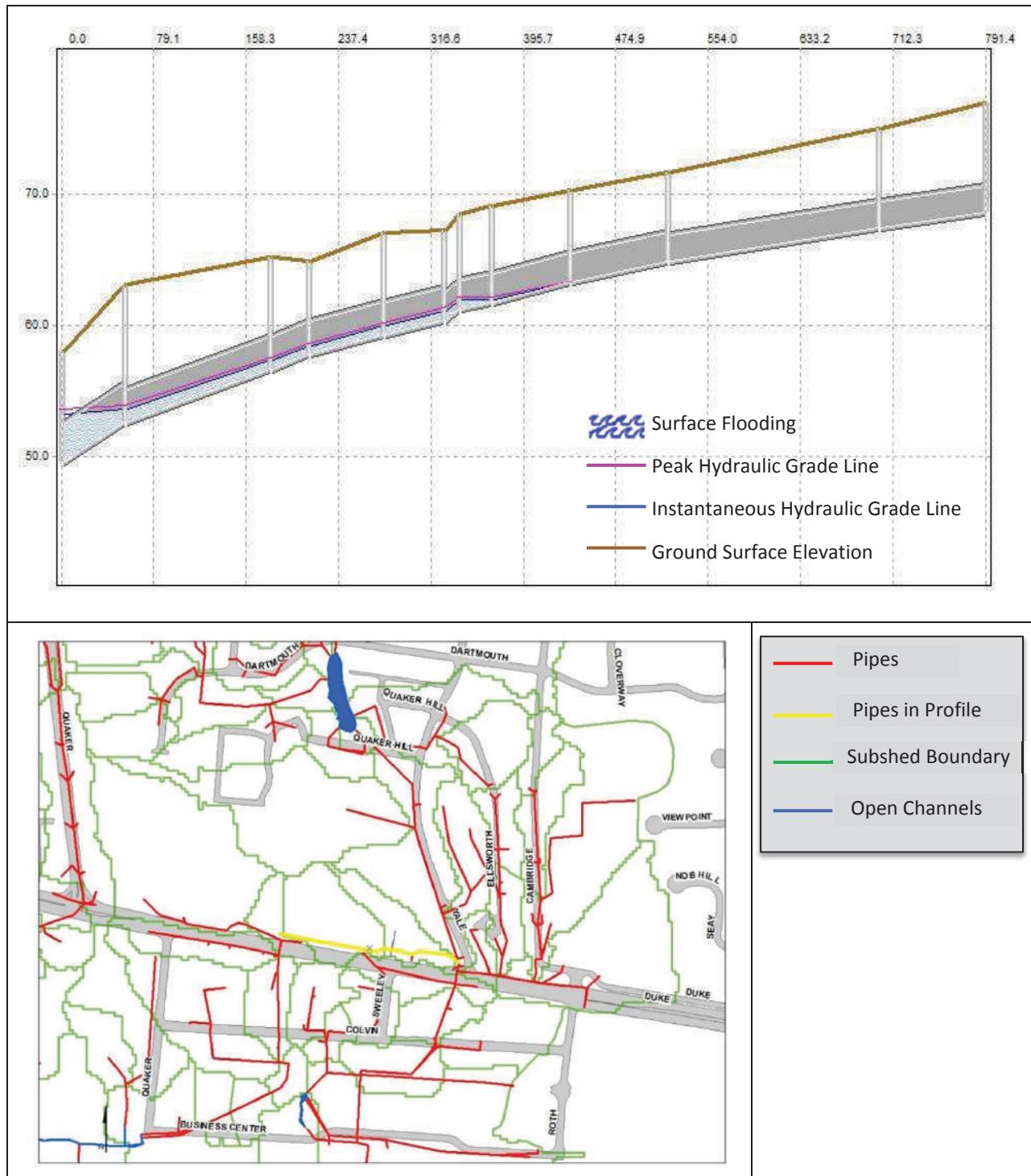


FIGURE 31

Cameron Run Center - Profile 31 from 002394IN to 000836SMH

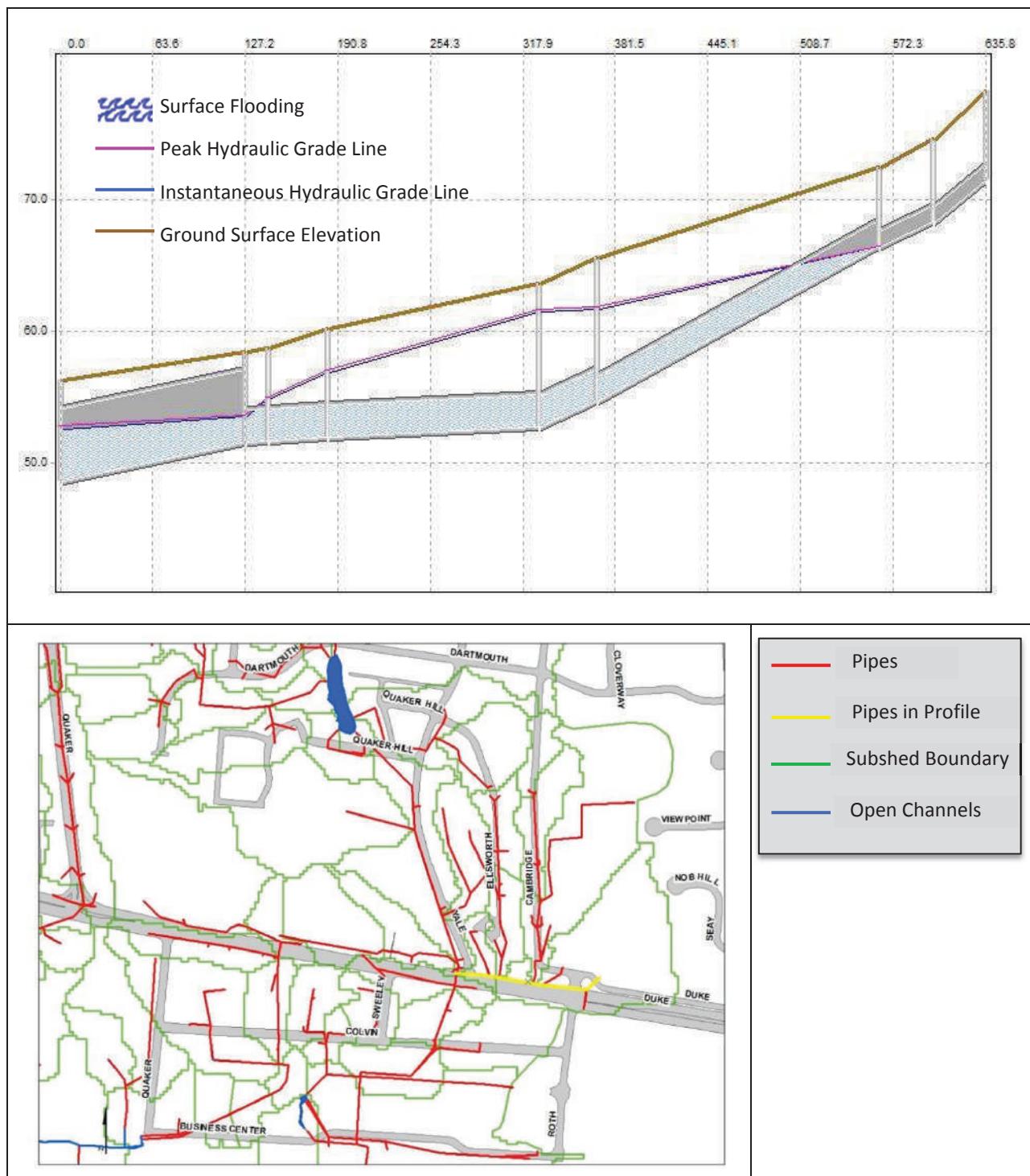


FIGURE 32

Cameron Run Center - Profile 32 from 000794SMH to 000300ND

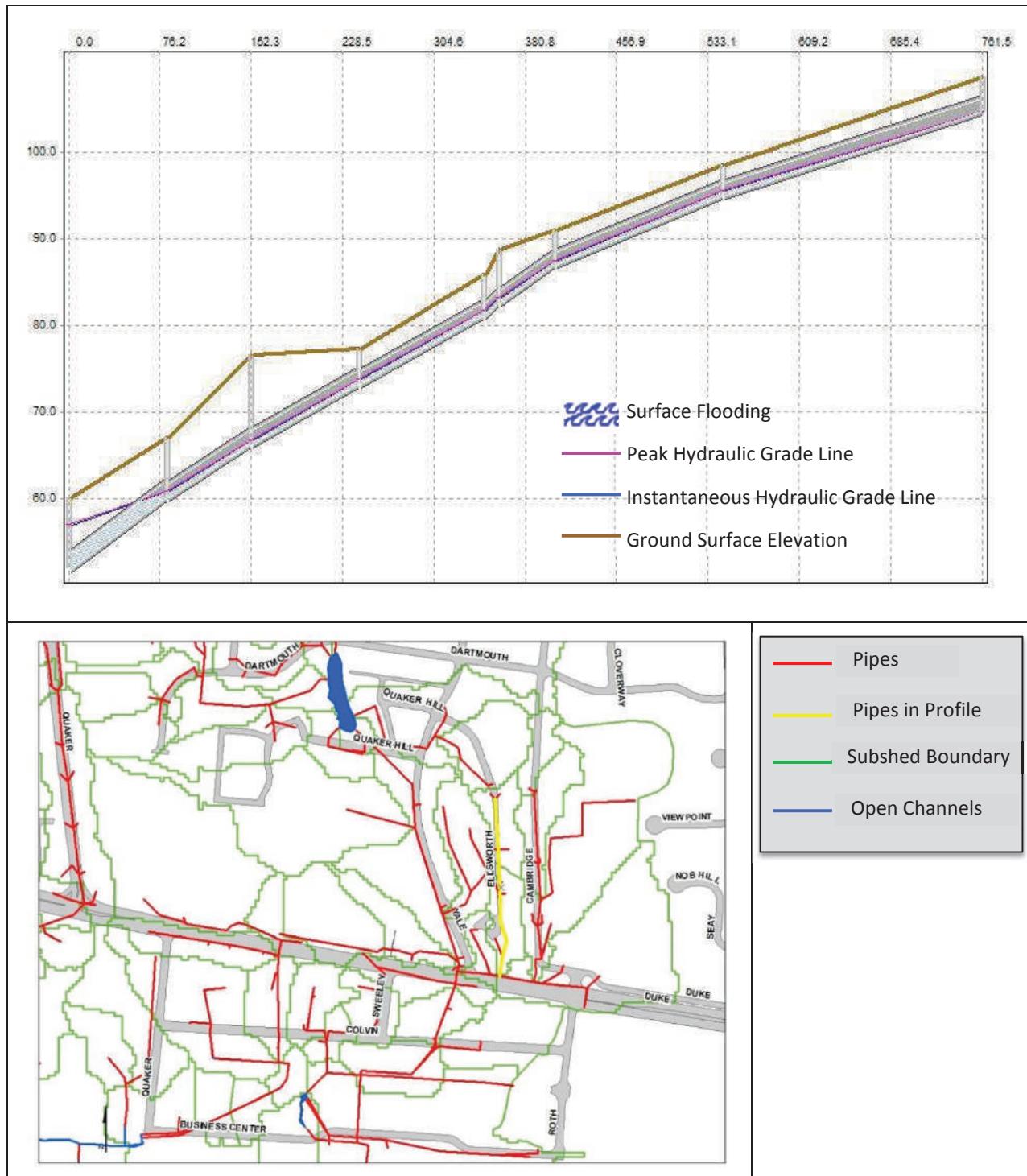


FIGURE 33

Cameron Run Center - Profile 33 from 002319IN to 000835SMH

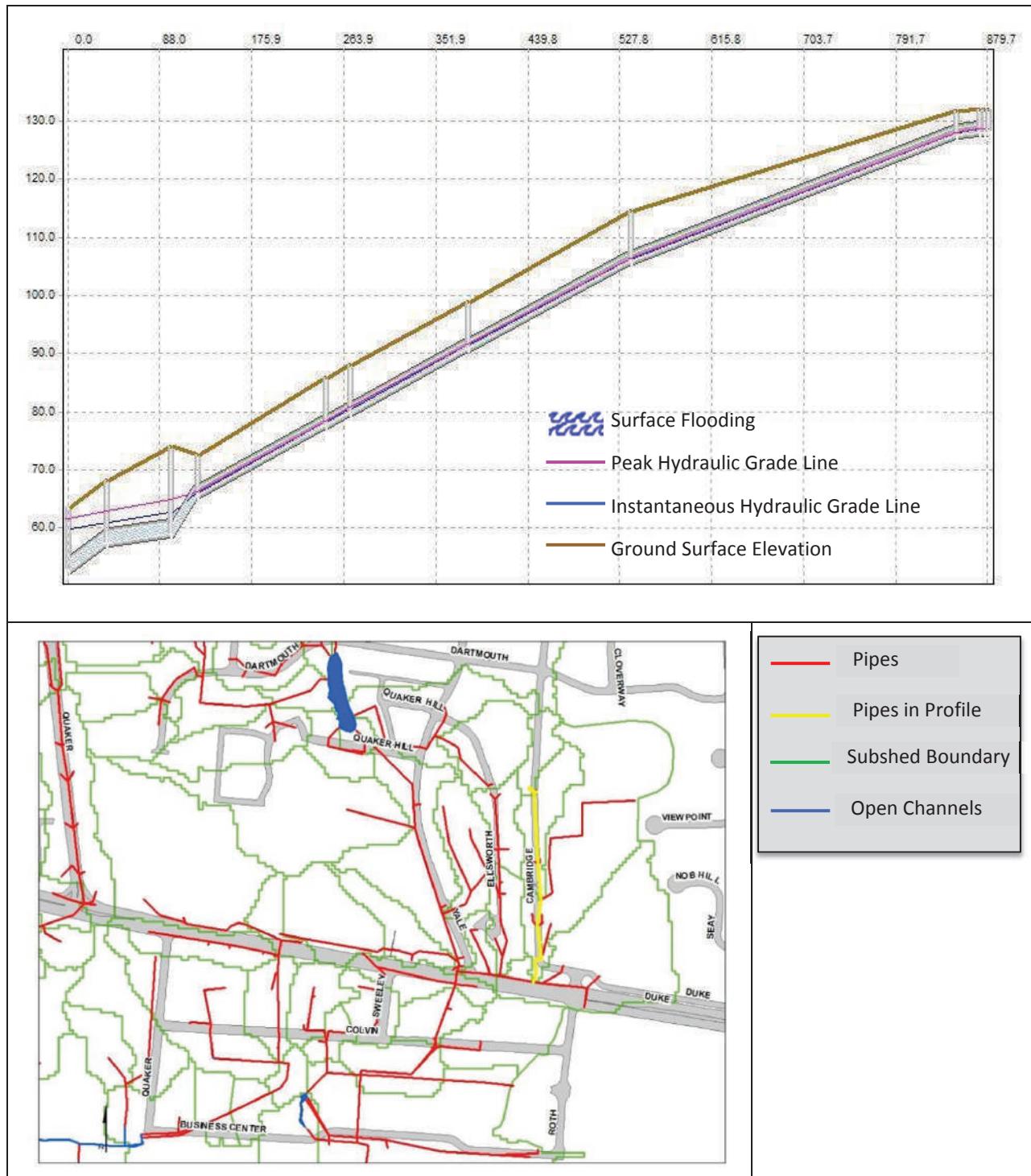


FIGURE 34

Cameron Run Center - Profile 34 from Node5179 to 000790SMH

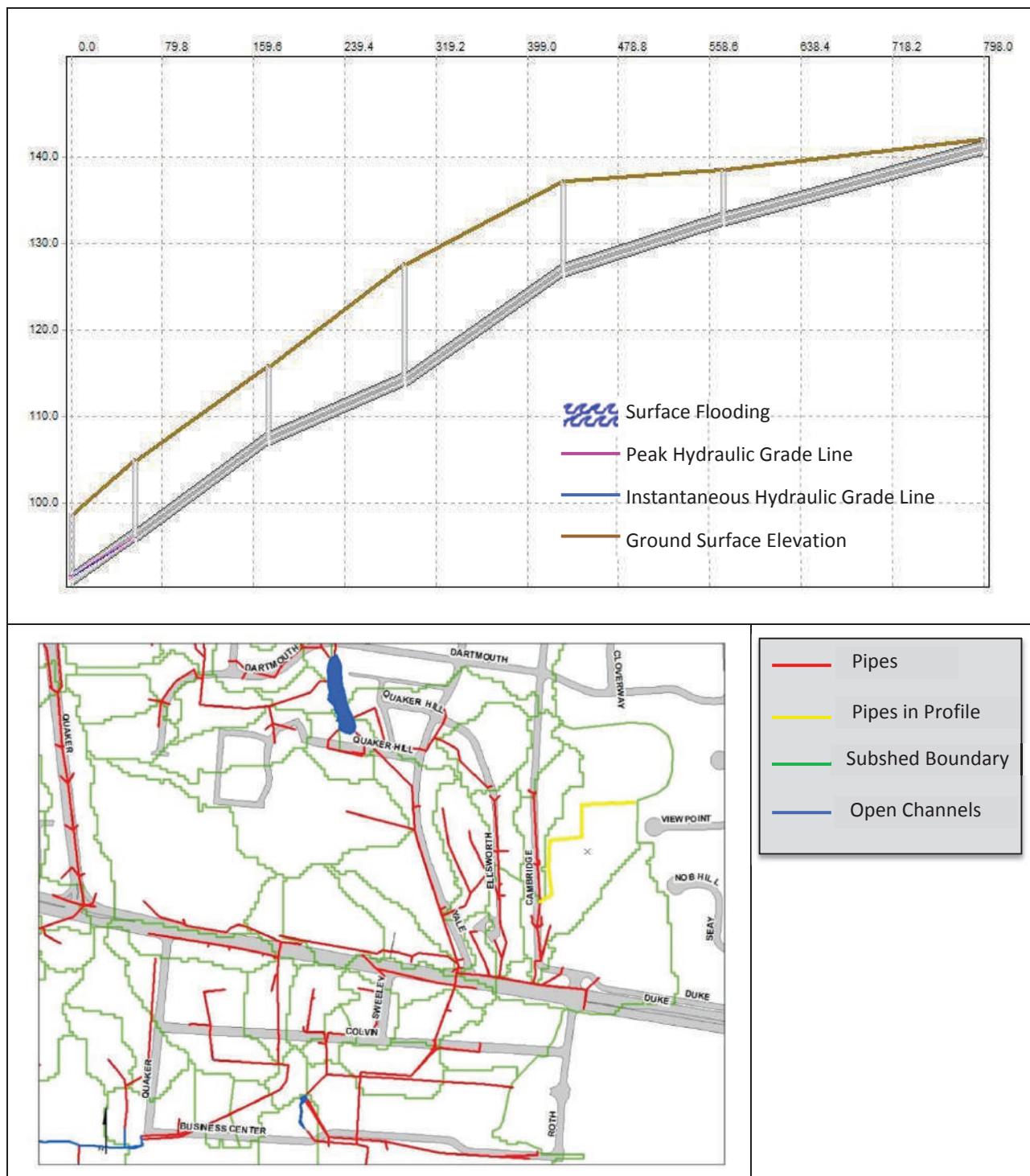


FIGURE 35

Cameron Run Center - Profile 35 from 002382IN to 000294ND

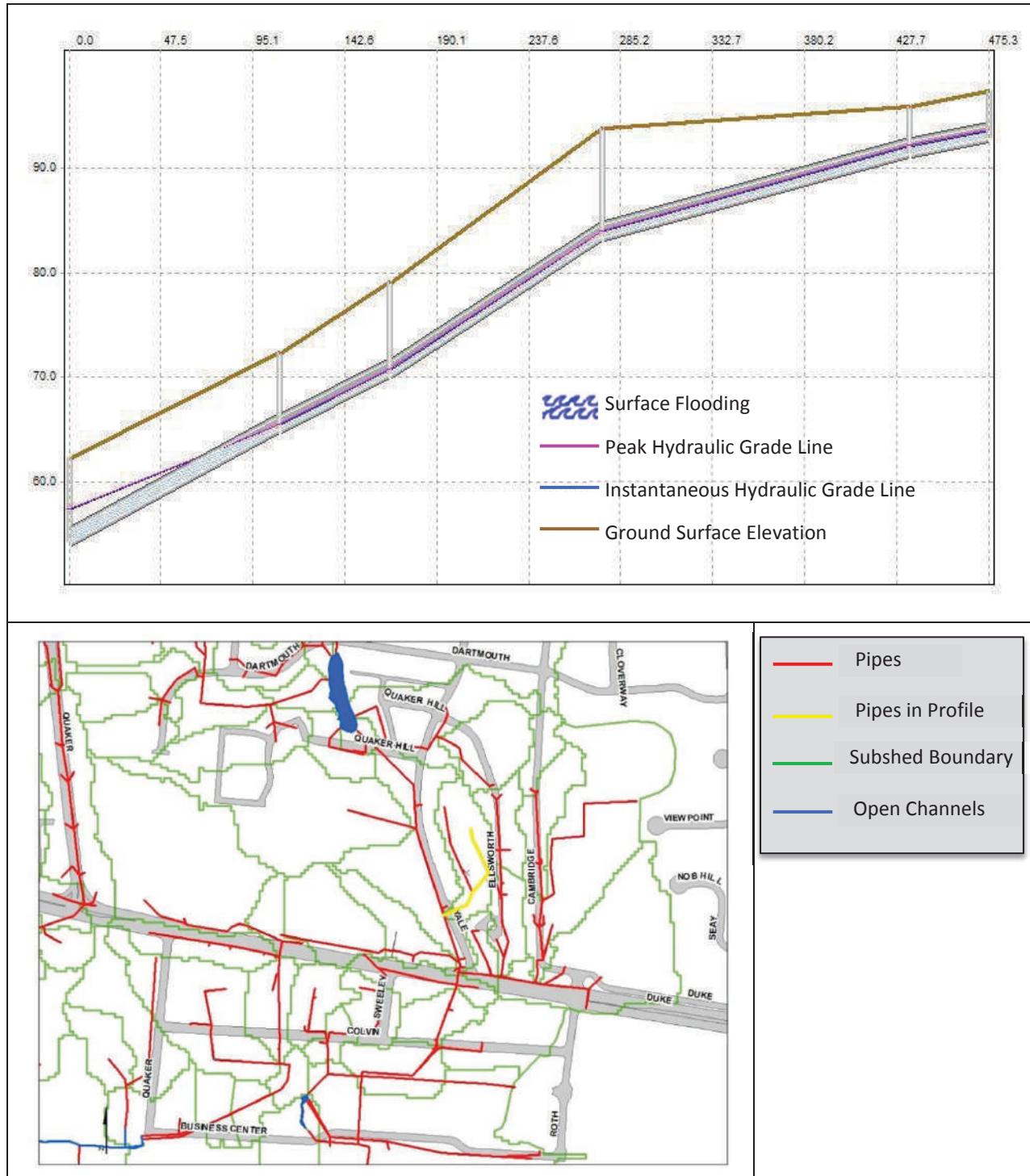


FIGURE 36

Cameron Run Center - Profile 36 from 002378IN to 000169IO

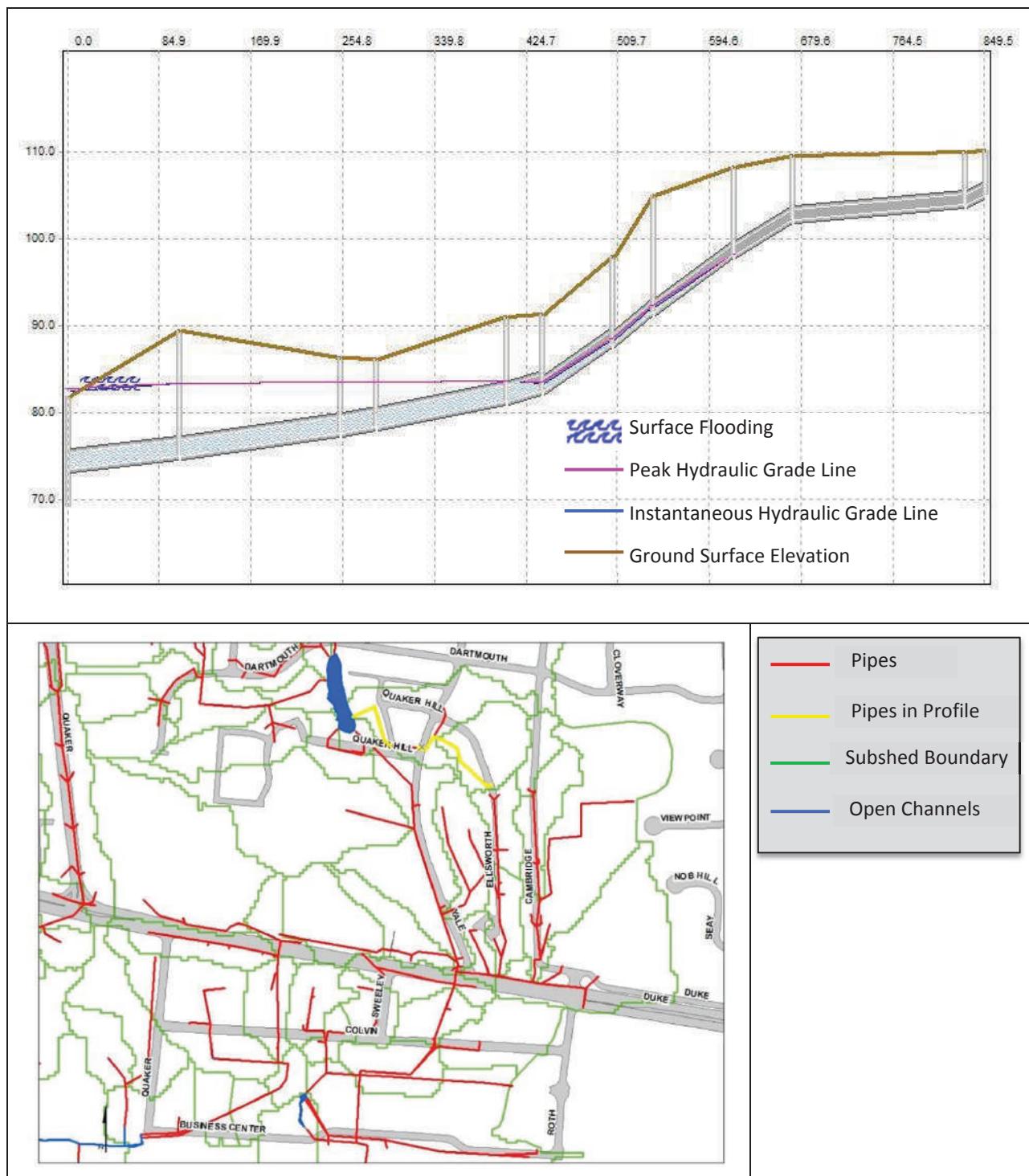


FIGURE 37

Cameron Run Center - Profile 37 from 002361IN to 000177IO

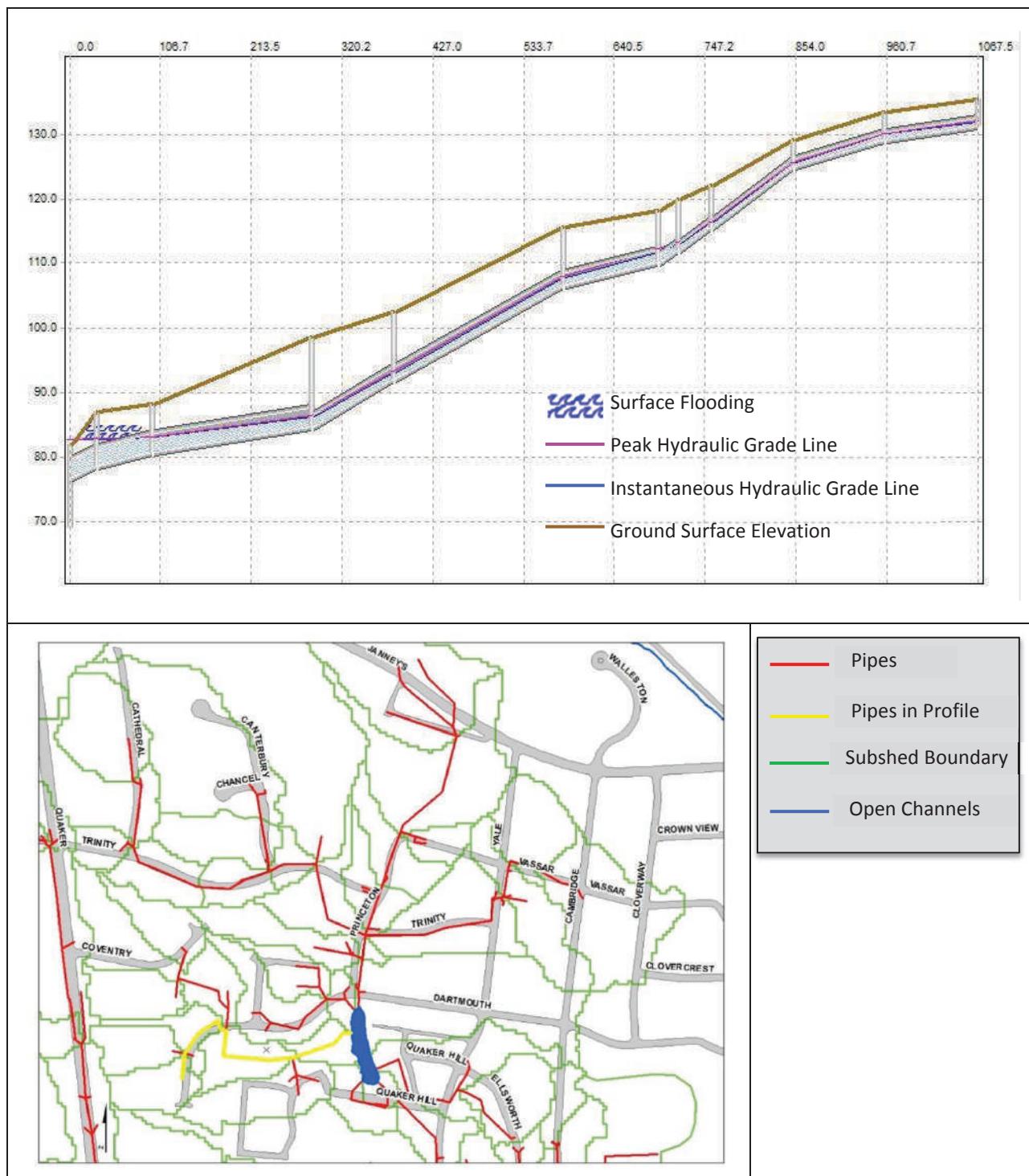


FIGURE 38

Cameron Run Center - Profile 38 from 001252IN to 002348IN

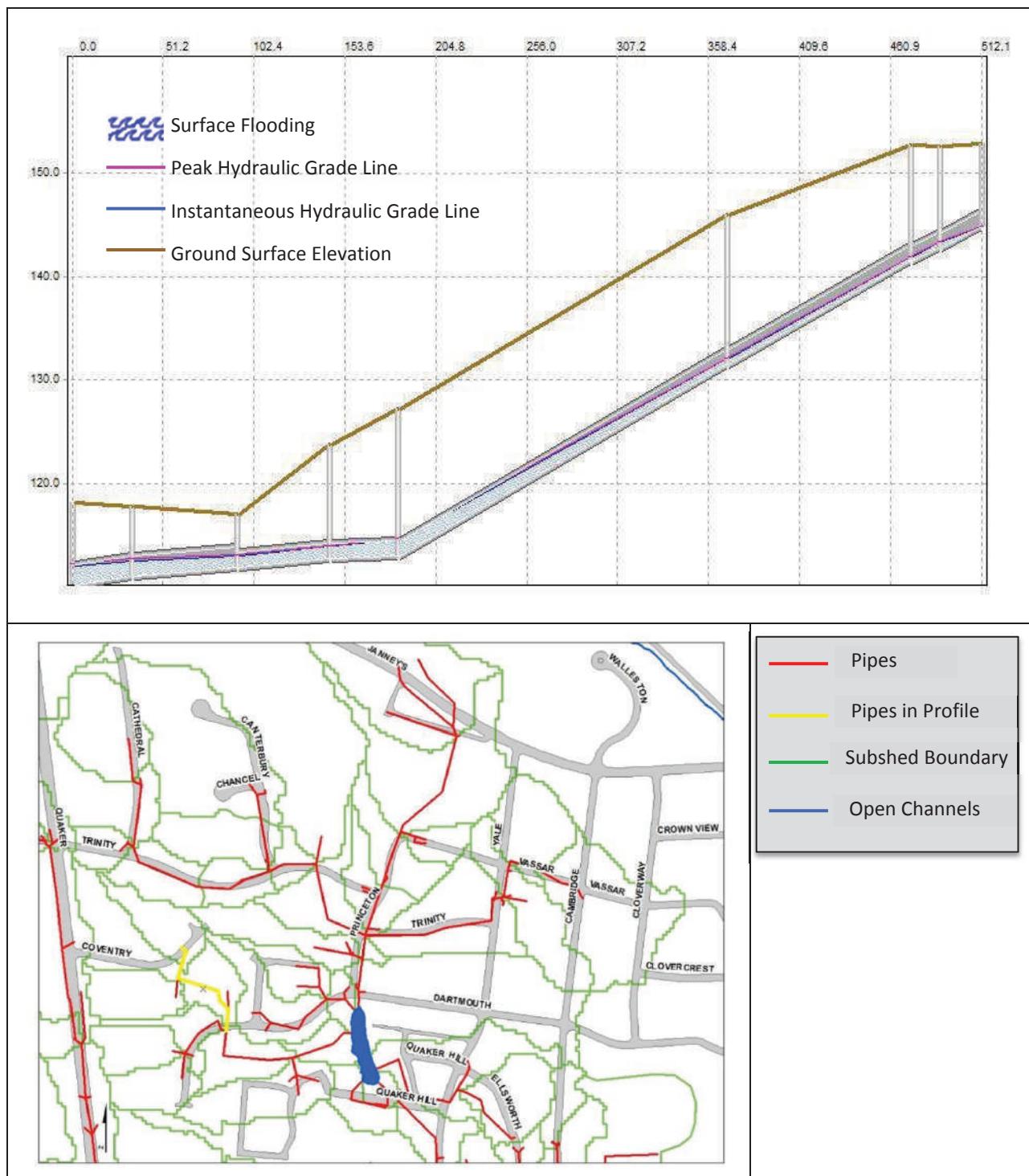


FIGURE 39

Cameron Run Center - Profile 39 from 001188IN to 000099IO

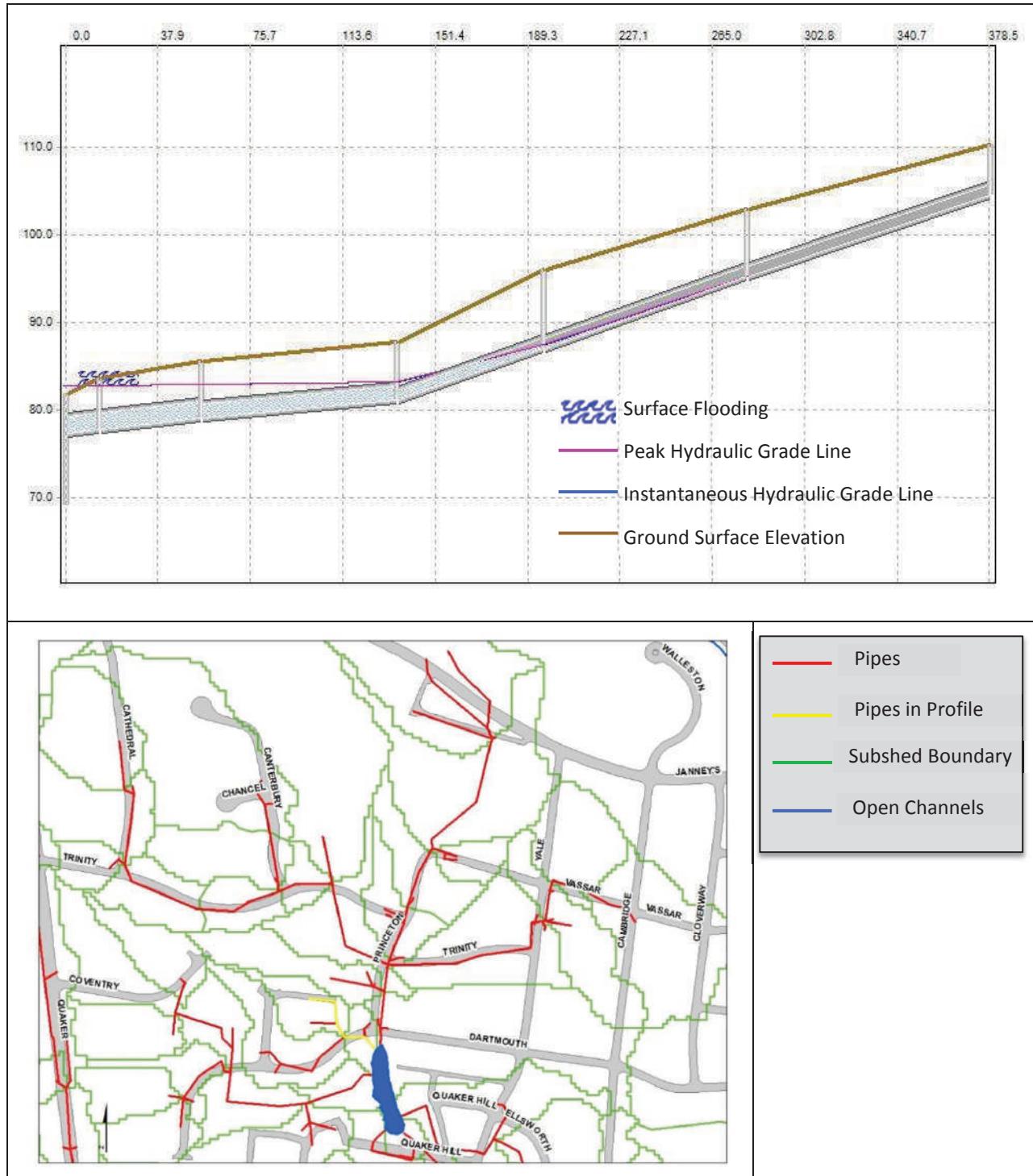


FIGURE 40

Cameron Run Center - Profile 40 from 001246IN to 000098IO

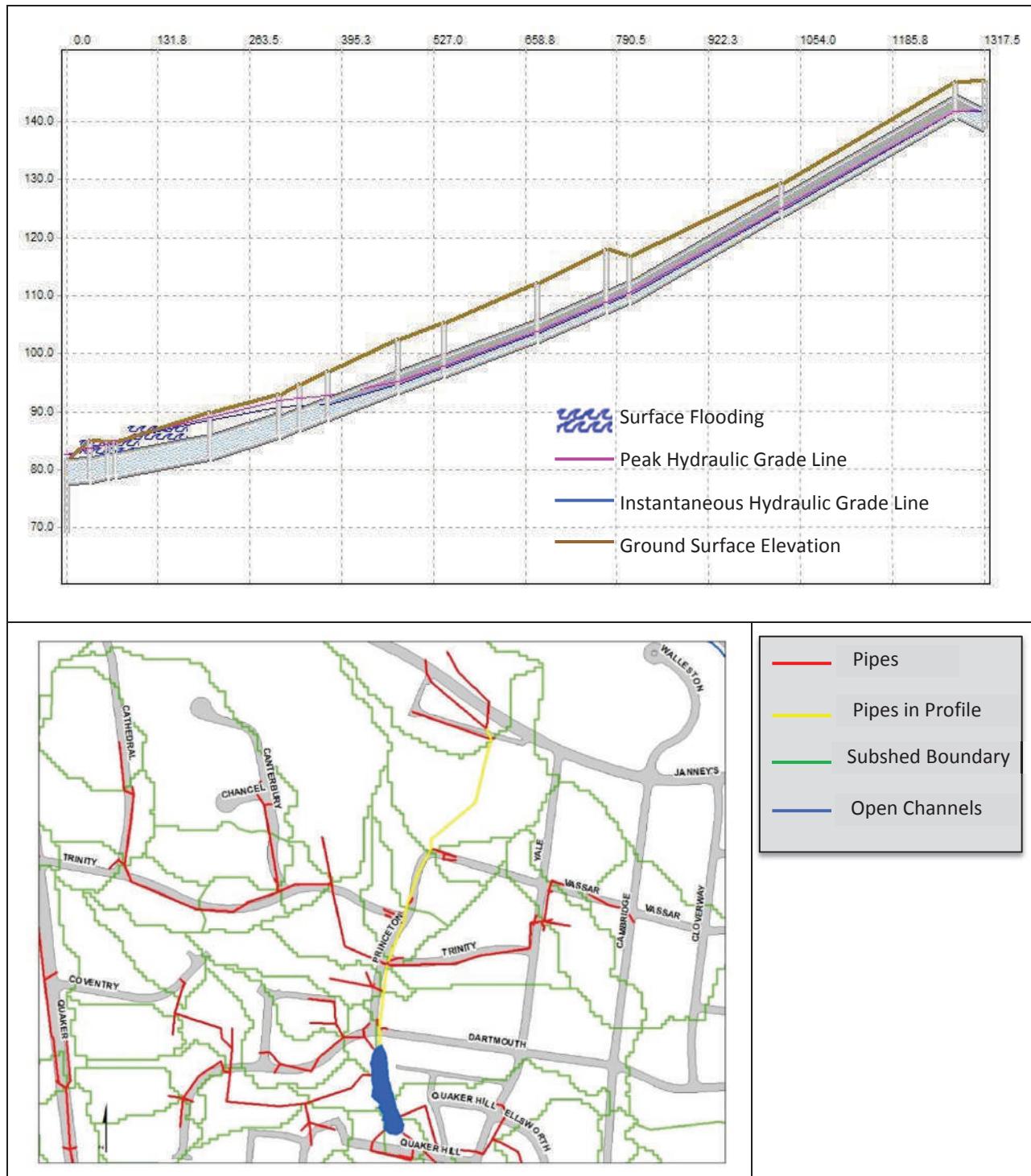


FIGURE 41

Cameron Run Center - Profile 41 from 001204IN to 000489SMH

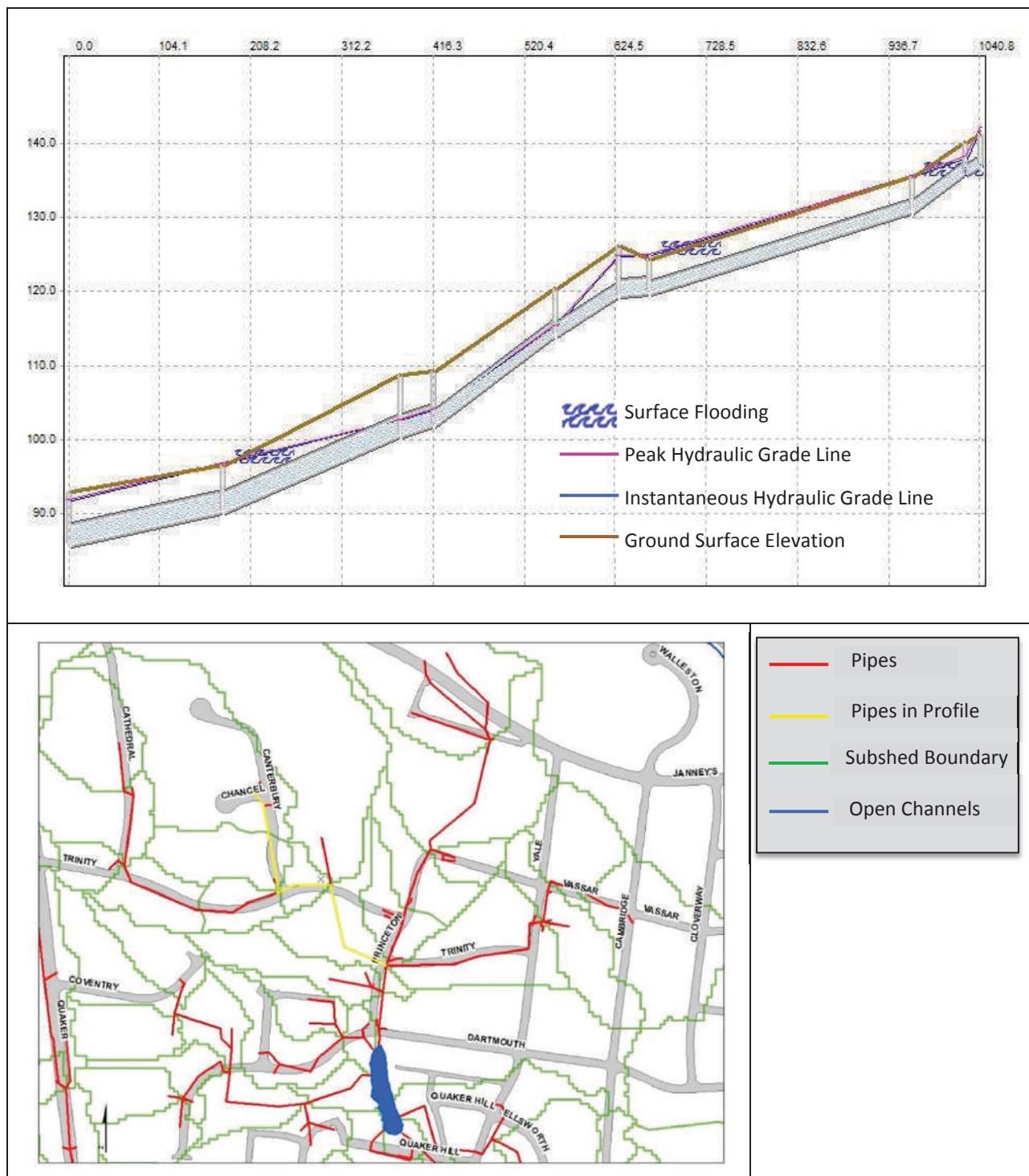


FIGURE 42

Cameron Run Center - Profile 42 from 001225IN to 000487SMH

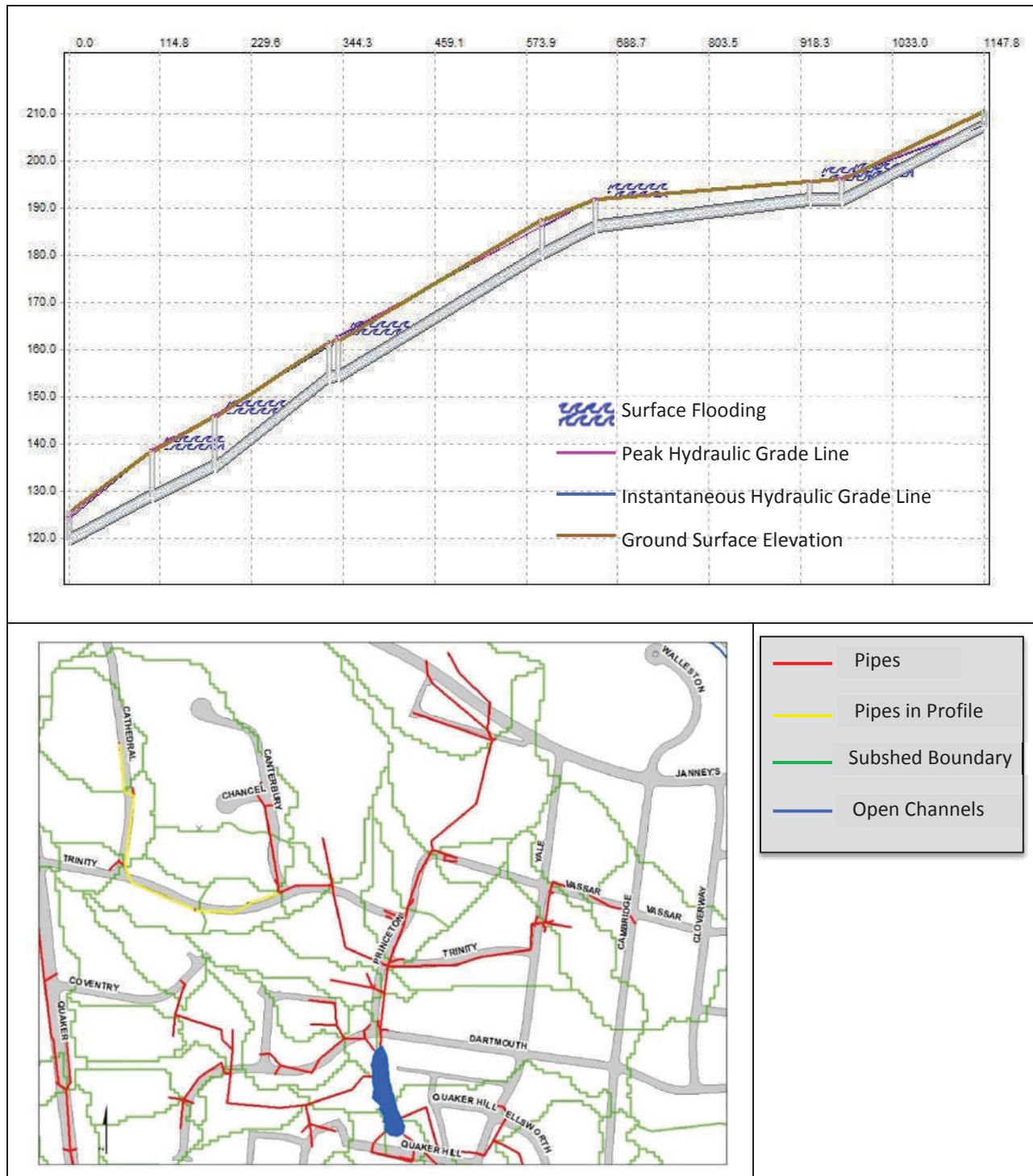


FIGURE 43

Cameron Run Center - Profile 43 from 001139IN to 000489SMH

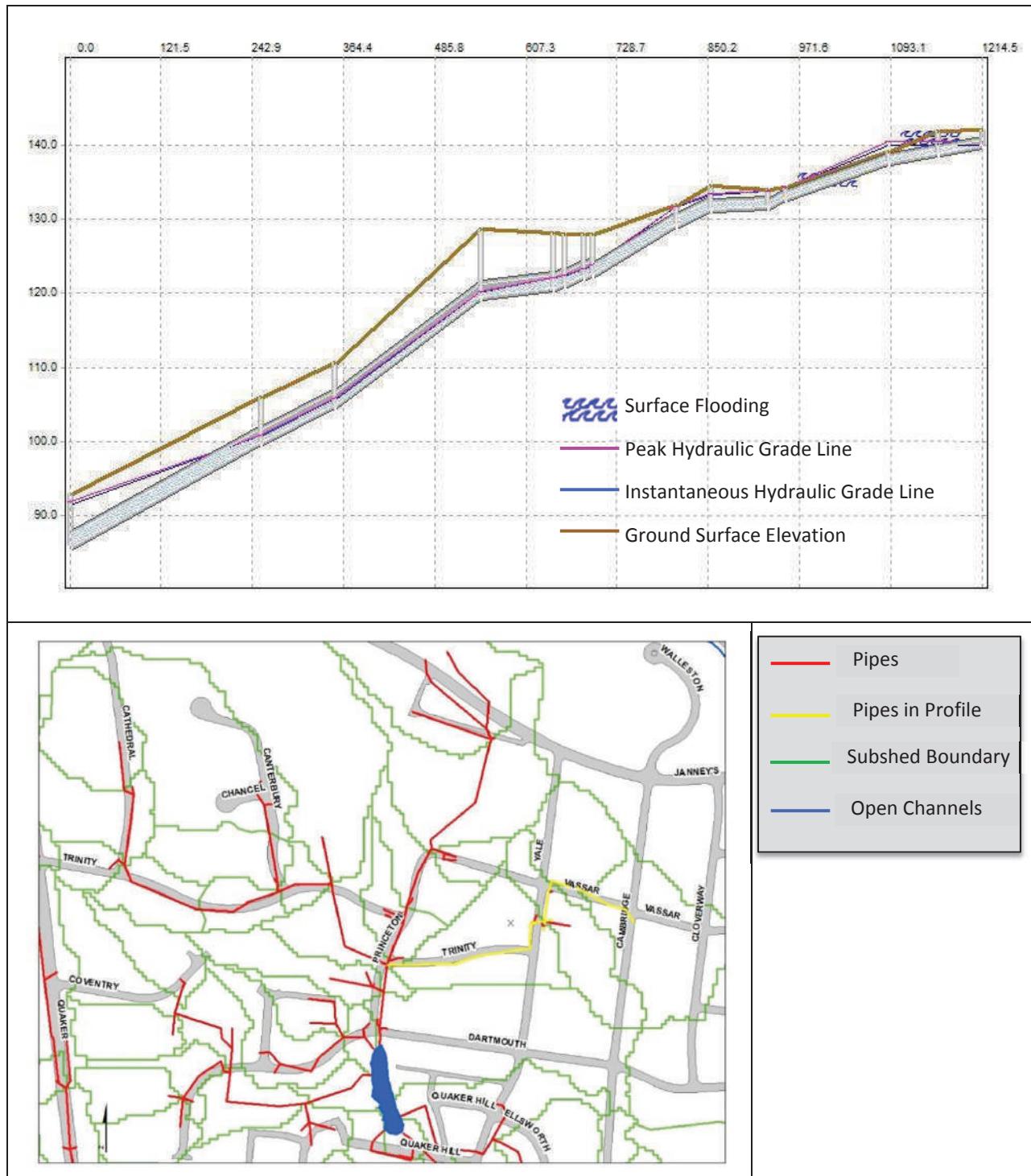


FIGURE 44

Cameron Run Southeast - Profile 44 from 000156IN to Node5183

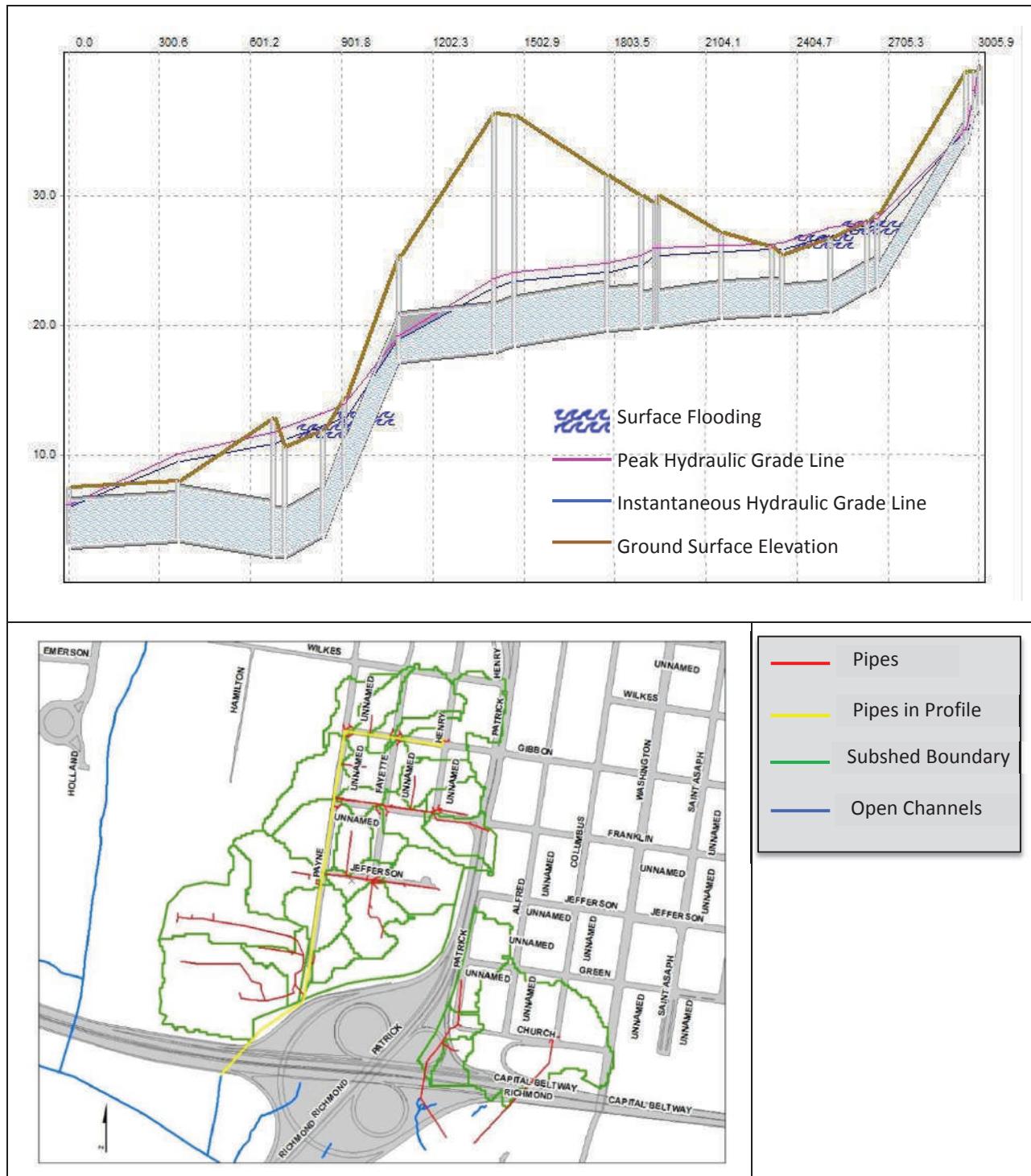


FIGURE 45

Cameron Run Southeast - Profile 45 from 004519IN to 009284IN

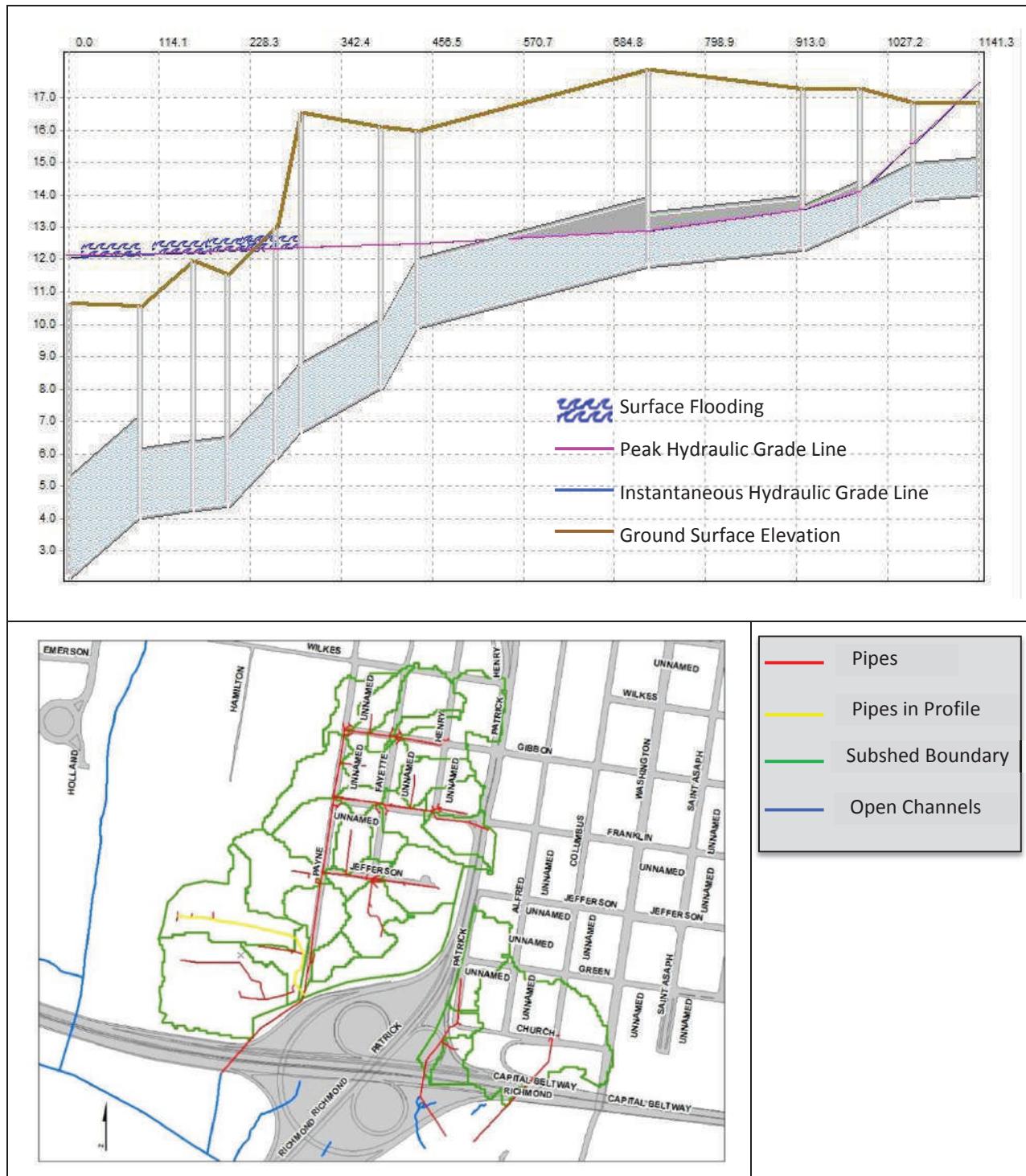


FIGURE 46

Cameron Run Southeast - Profile 46 from 004524IN to 004526IN

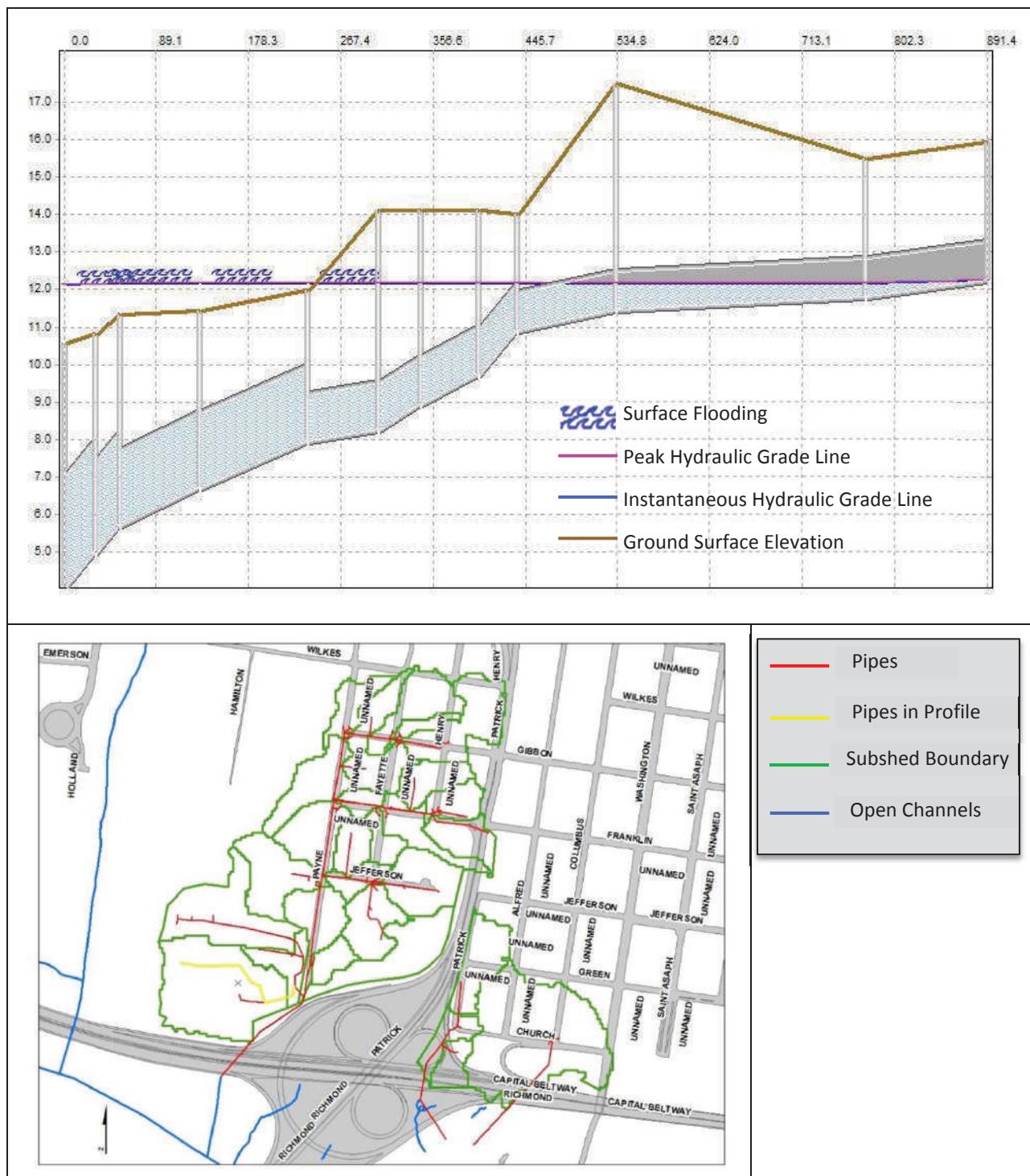


FIGURE 47

Cameron Run Southeast - Profile 47 from 000205IN to 000066SMH

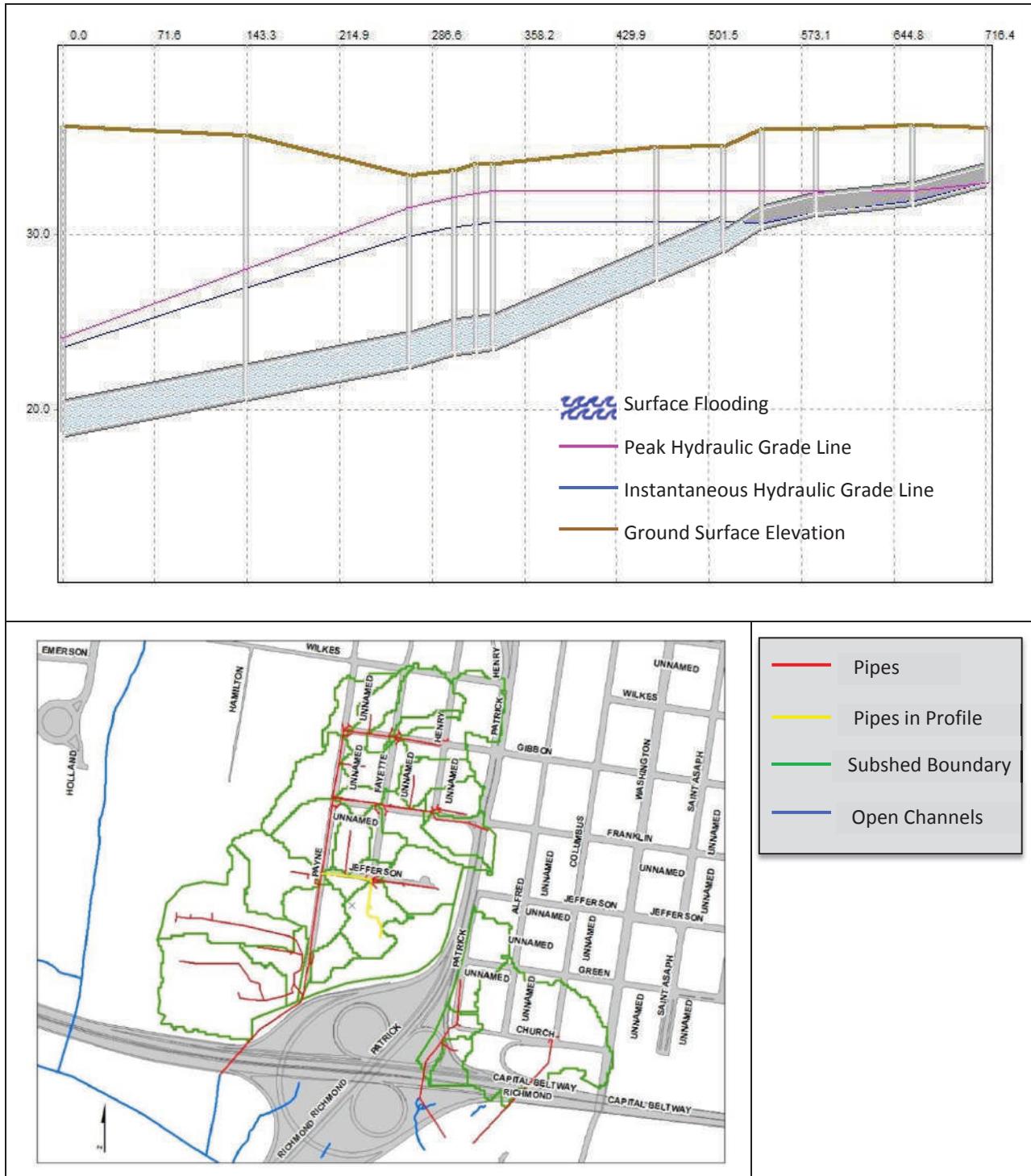


FIGURE 48

Cameron Run Southeast - Profile 48 from 000094SMH to 000064SMH

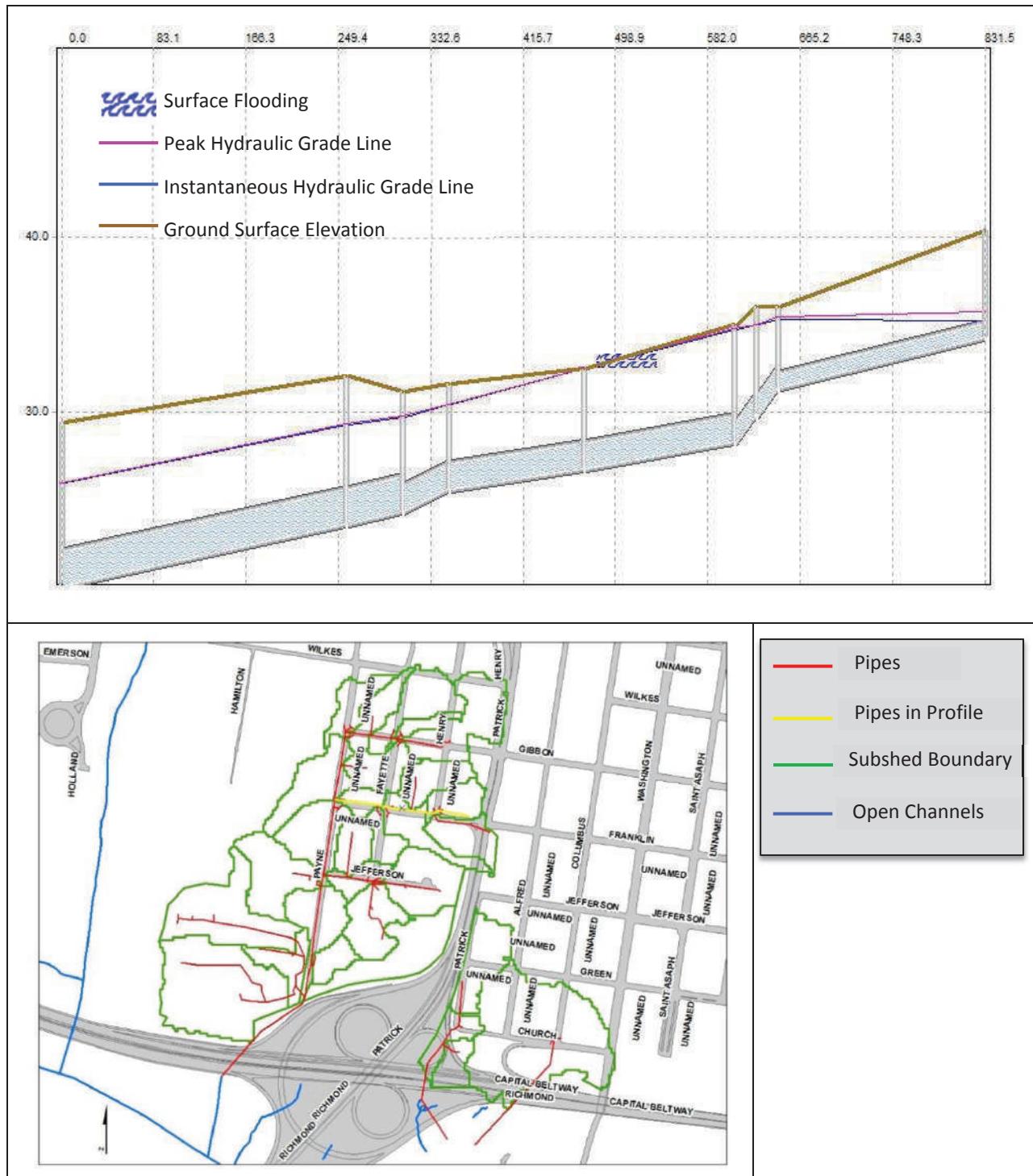


FIGURE 49

Cameron Run Southeast - Profile 49 from 000065IN to Node5181

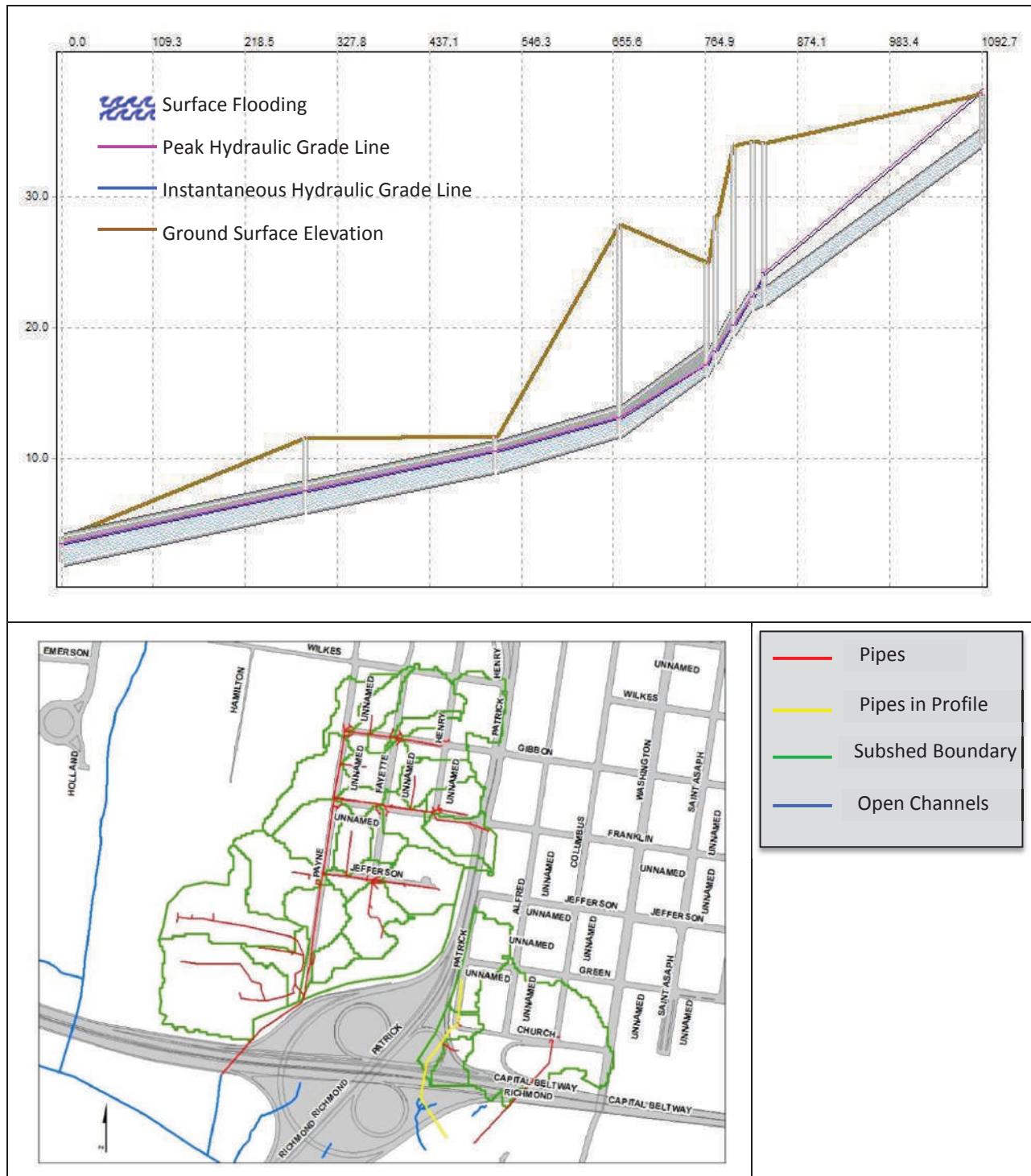


FIGURE 50

Cameron Run Southeast - Profile 50 from 000060IN to Node5182

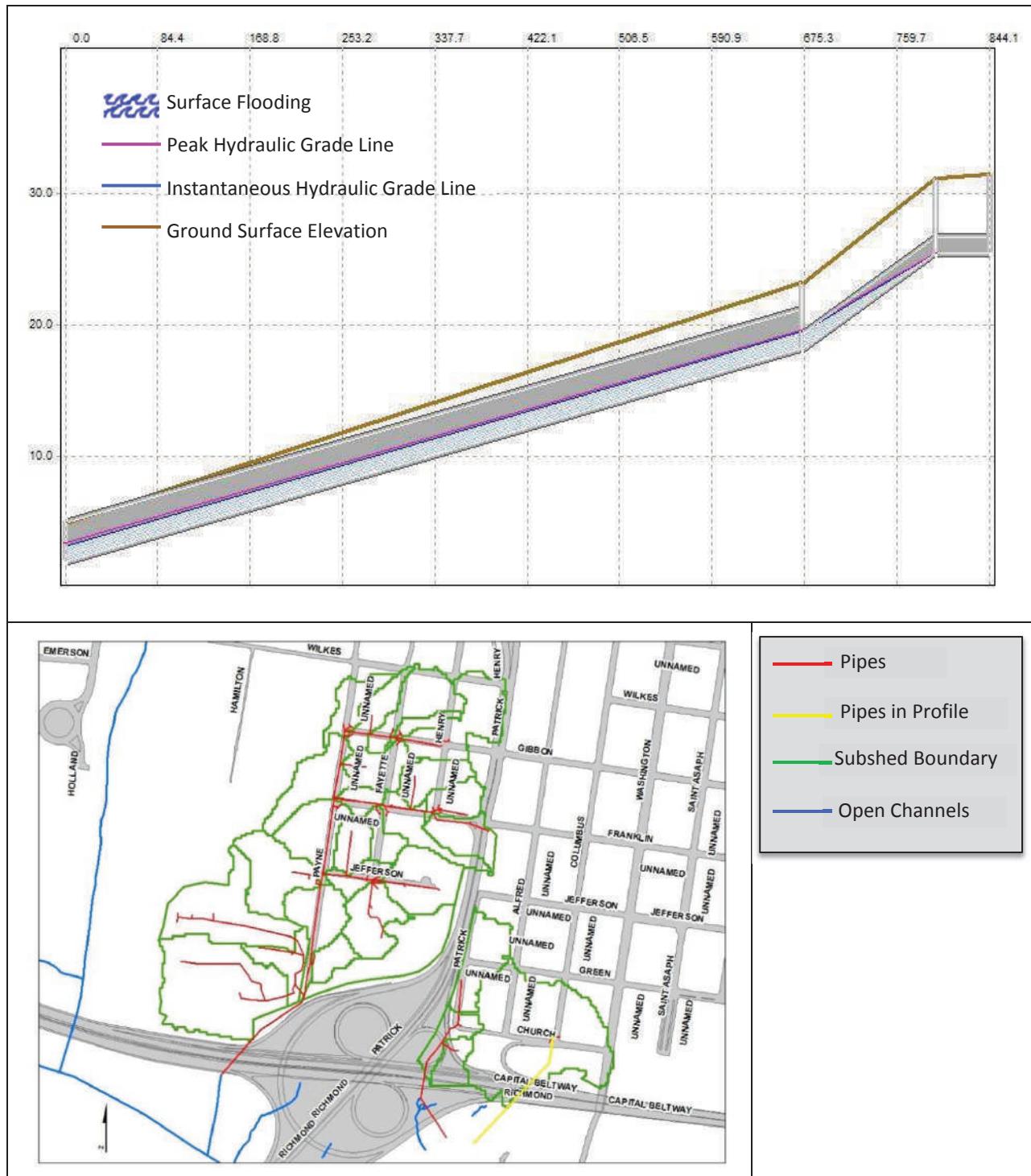


FIGURE 51

Cameron Run North Profile 1 from 000147IO to 002079IN



FIGURE 52

Cameron Run North Profile 2 from 000159IO to 000276ND

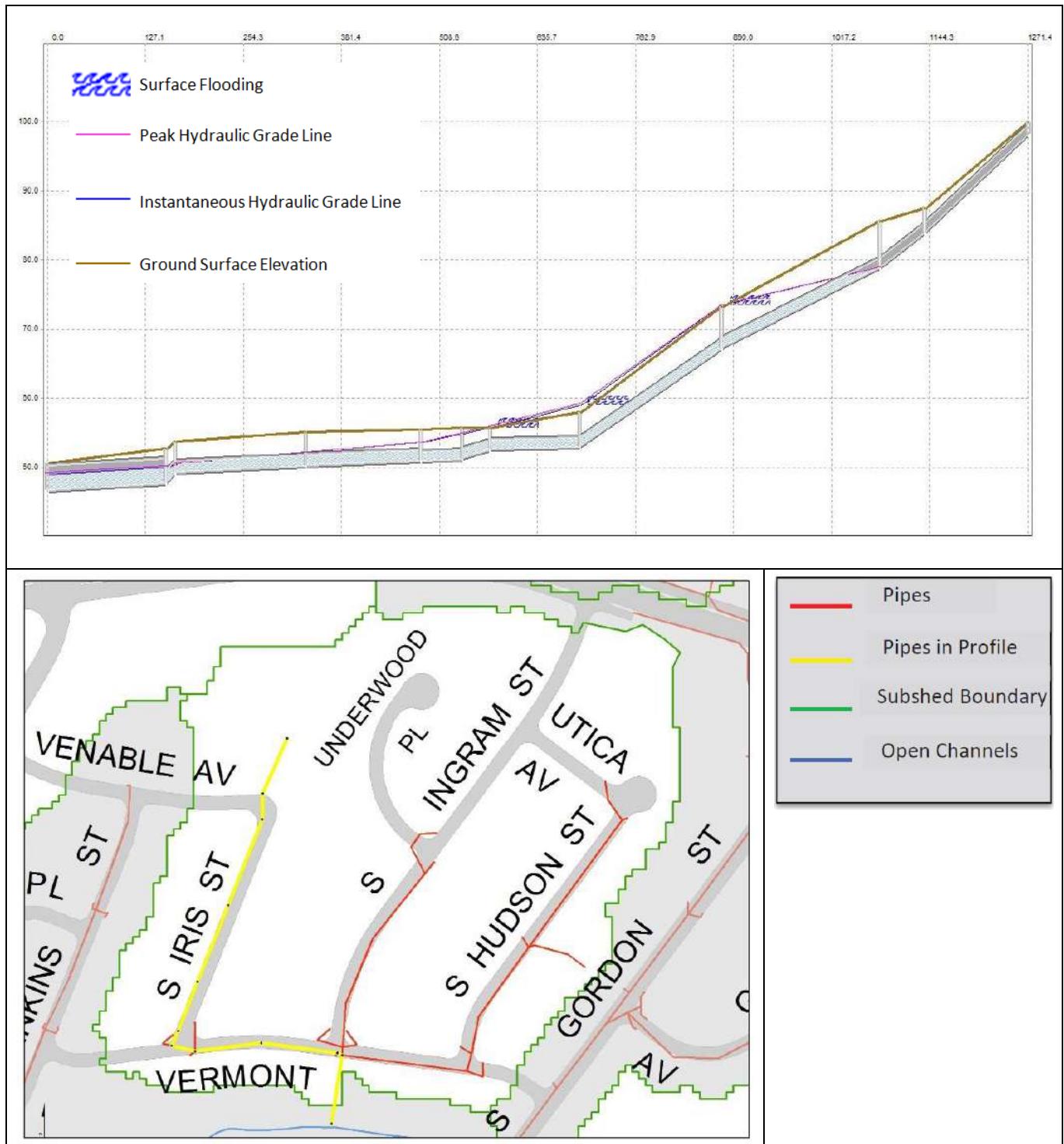


FIGURE 53

Cameron Run North Profile 3 from 000159IO to 002126IN

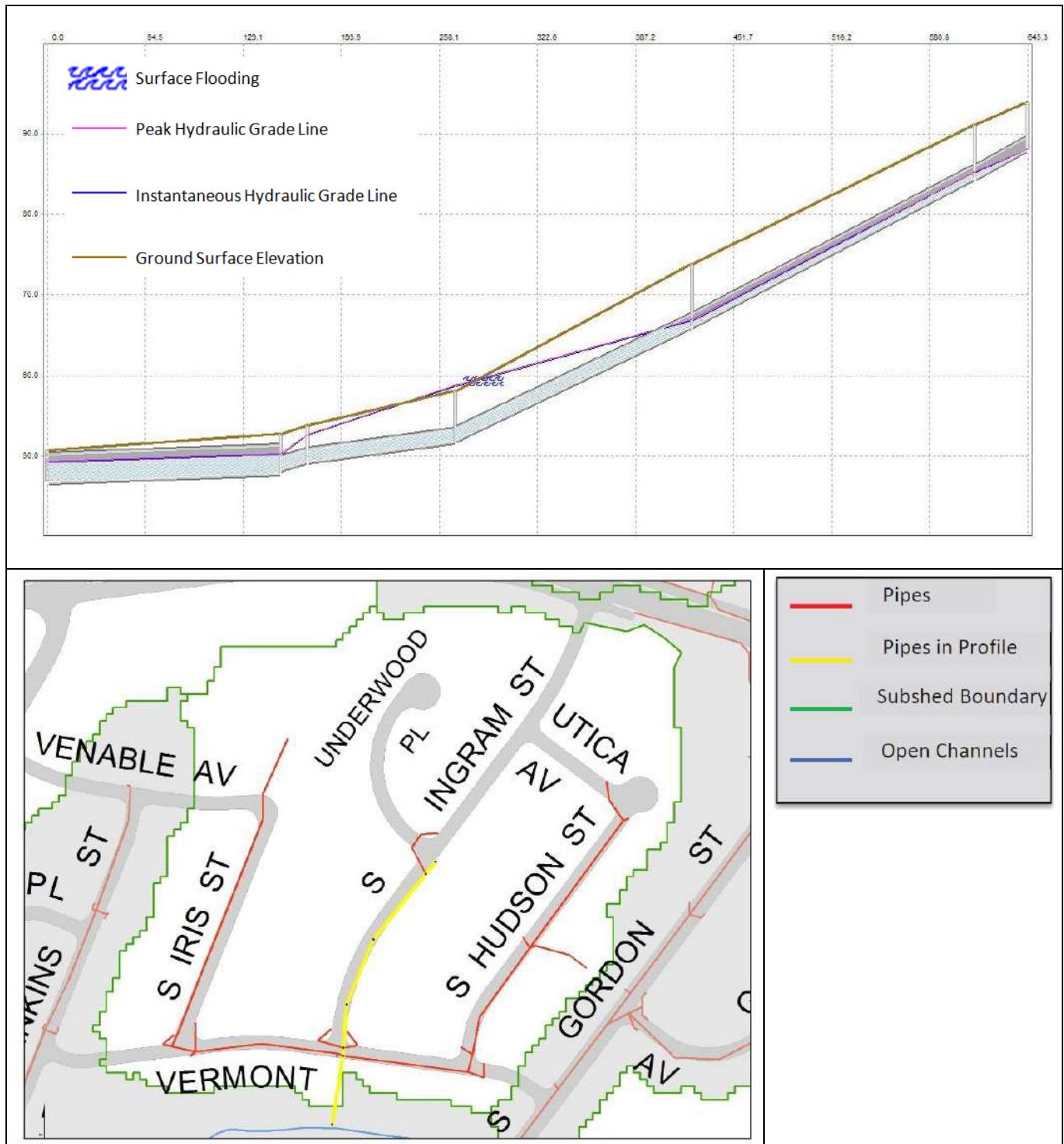


FIGURE 54

Cameron Run North Profile 4 from 000159IO to 002058IN

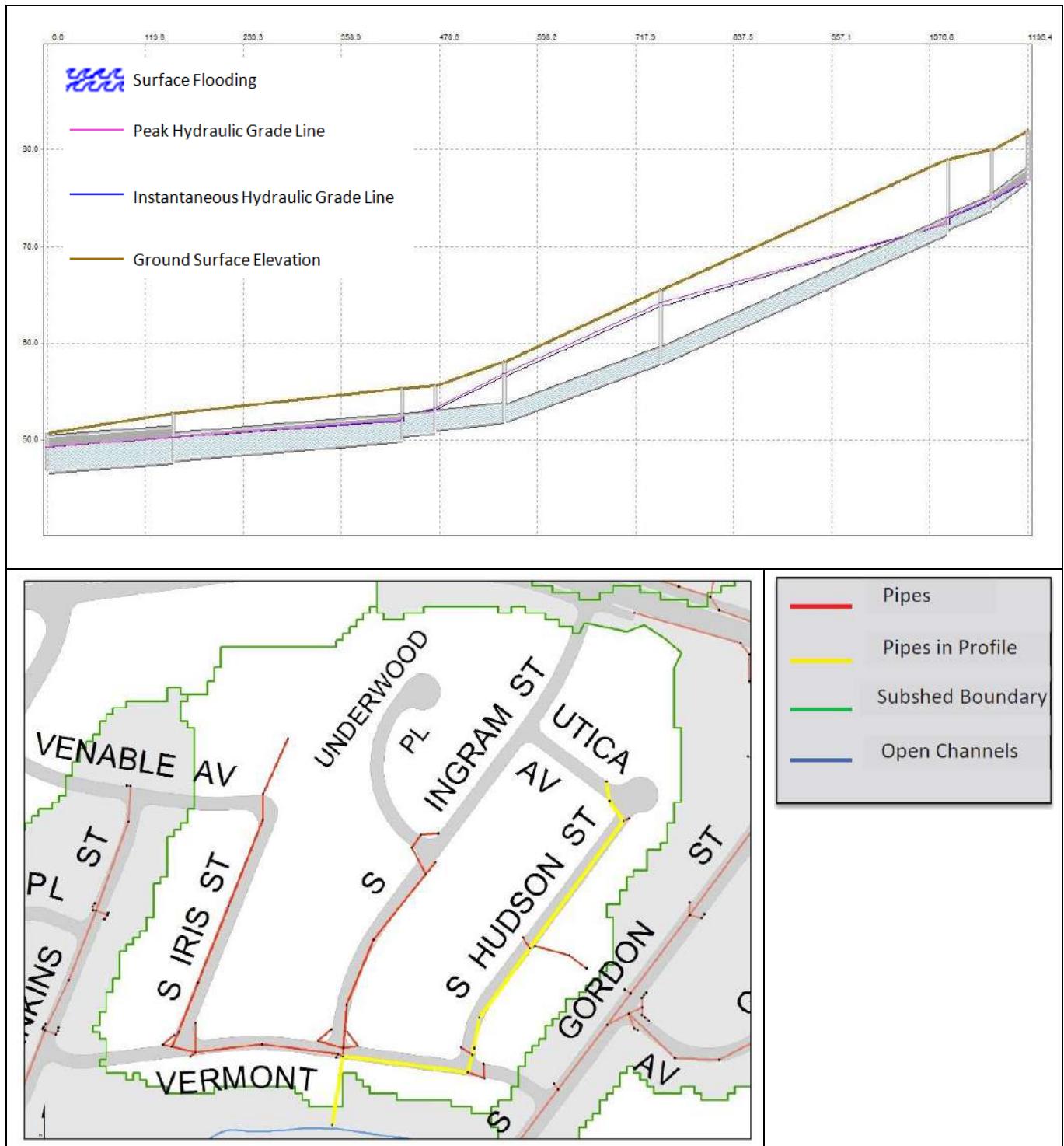


FIGURE 55

Cameron Run North Profile 5 from 000146IO to 000453SMH



FIGURE 56

Cameron Run North Profile 6 from 000677SMH to 001881IN

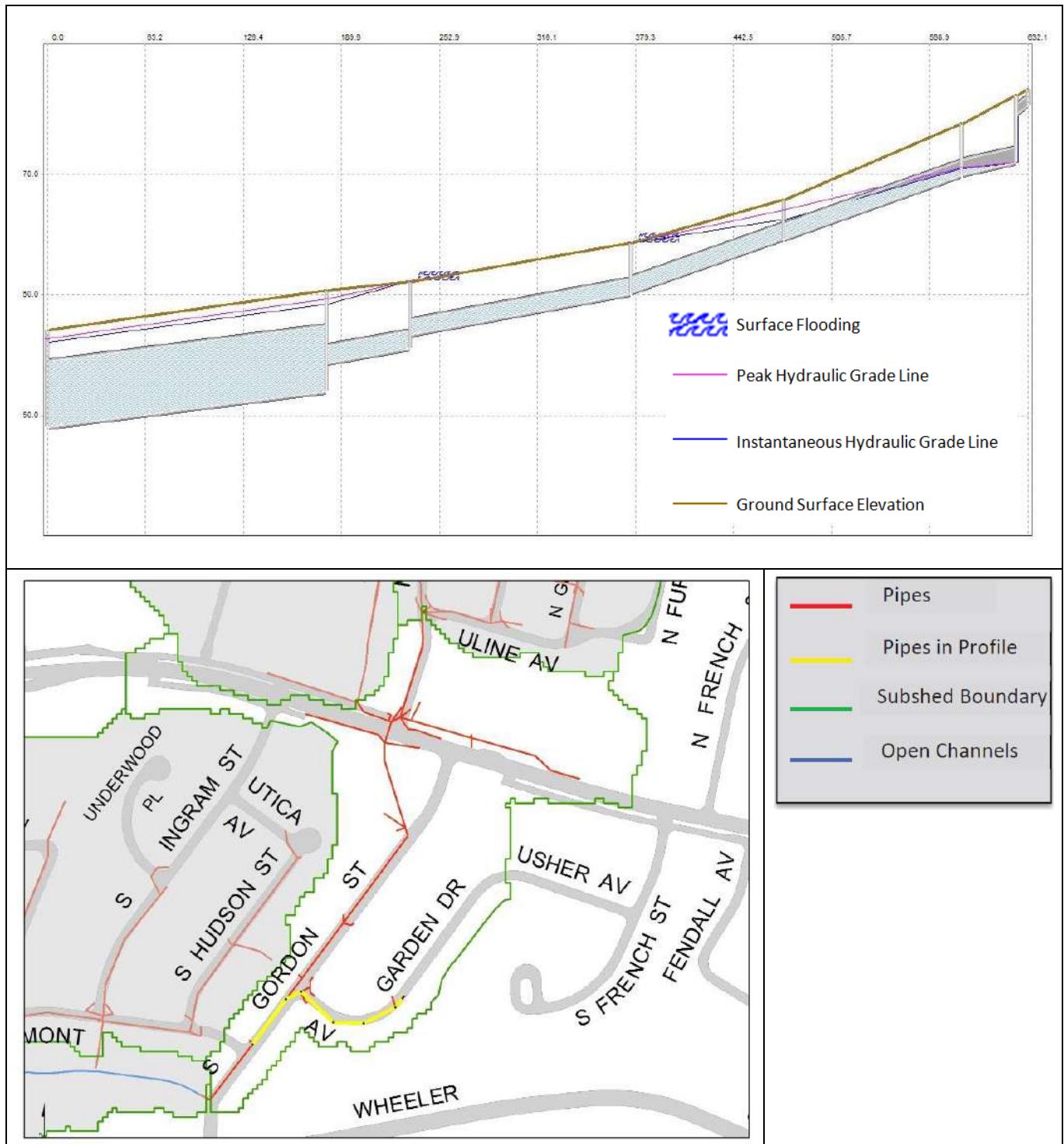


FIGURE 57

Cameron Run North Profile 7 from 001884IN to 001896IN

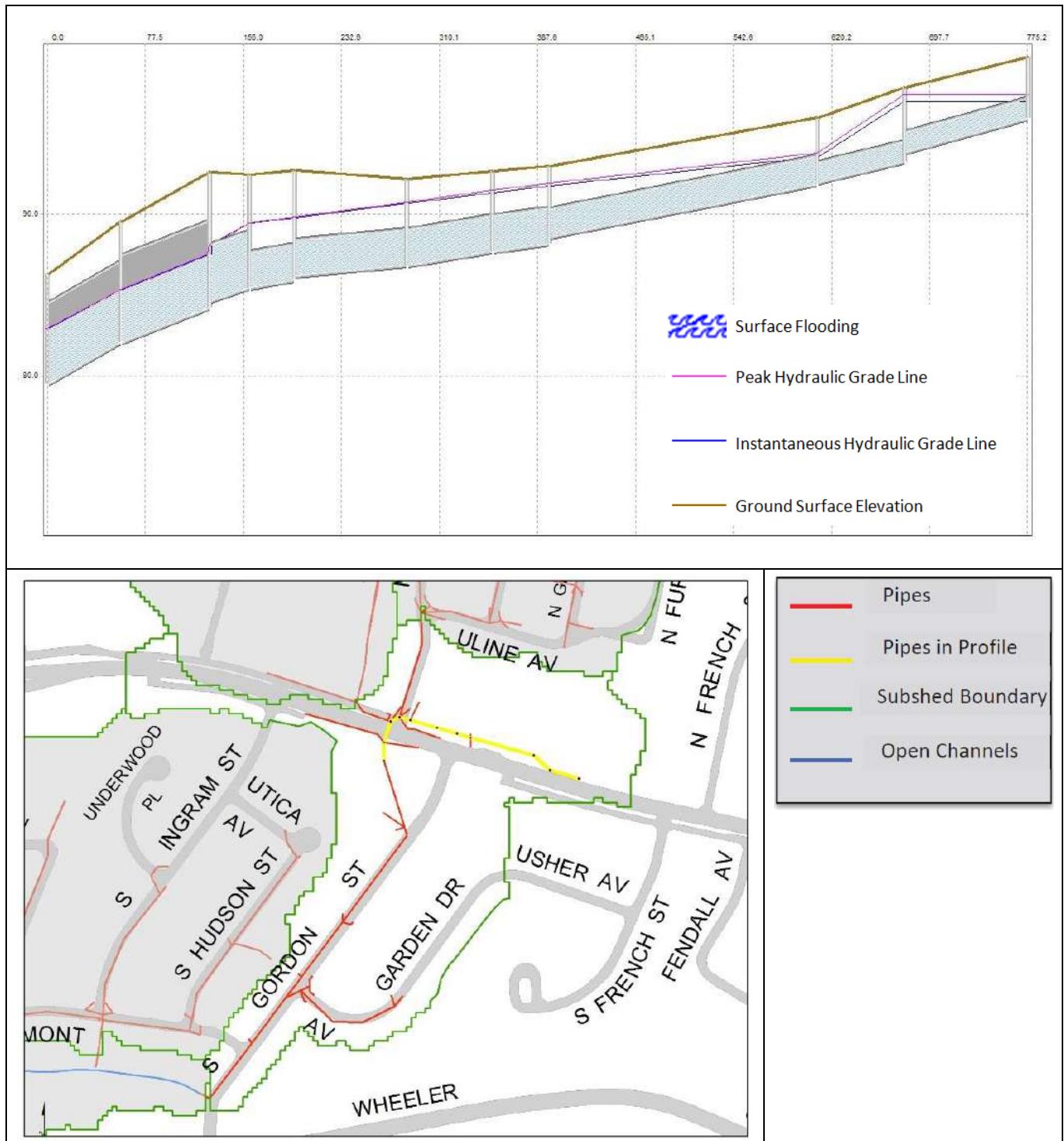


FIGURE 58

Cameron Run North Profile 8 from 000456SMH to 000437SMH

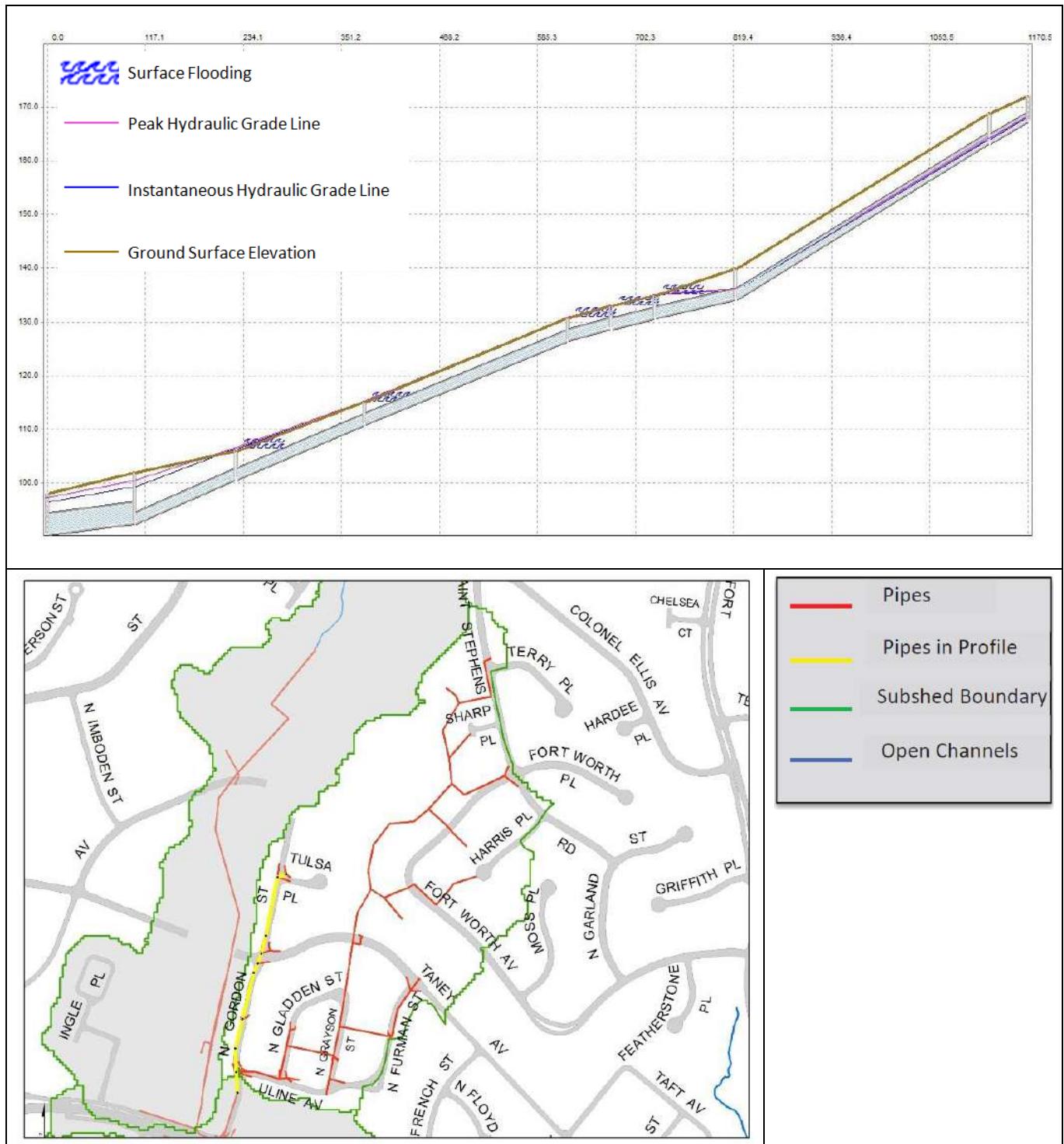


FIGURE 59

Cameron Run North Profile 9 from 000456SMH to 001506IN



FIGURE 60

Cameron Run North Profile 10 from 000454SMH to 001416IN

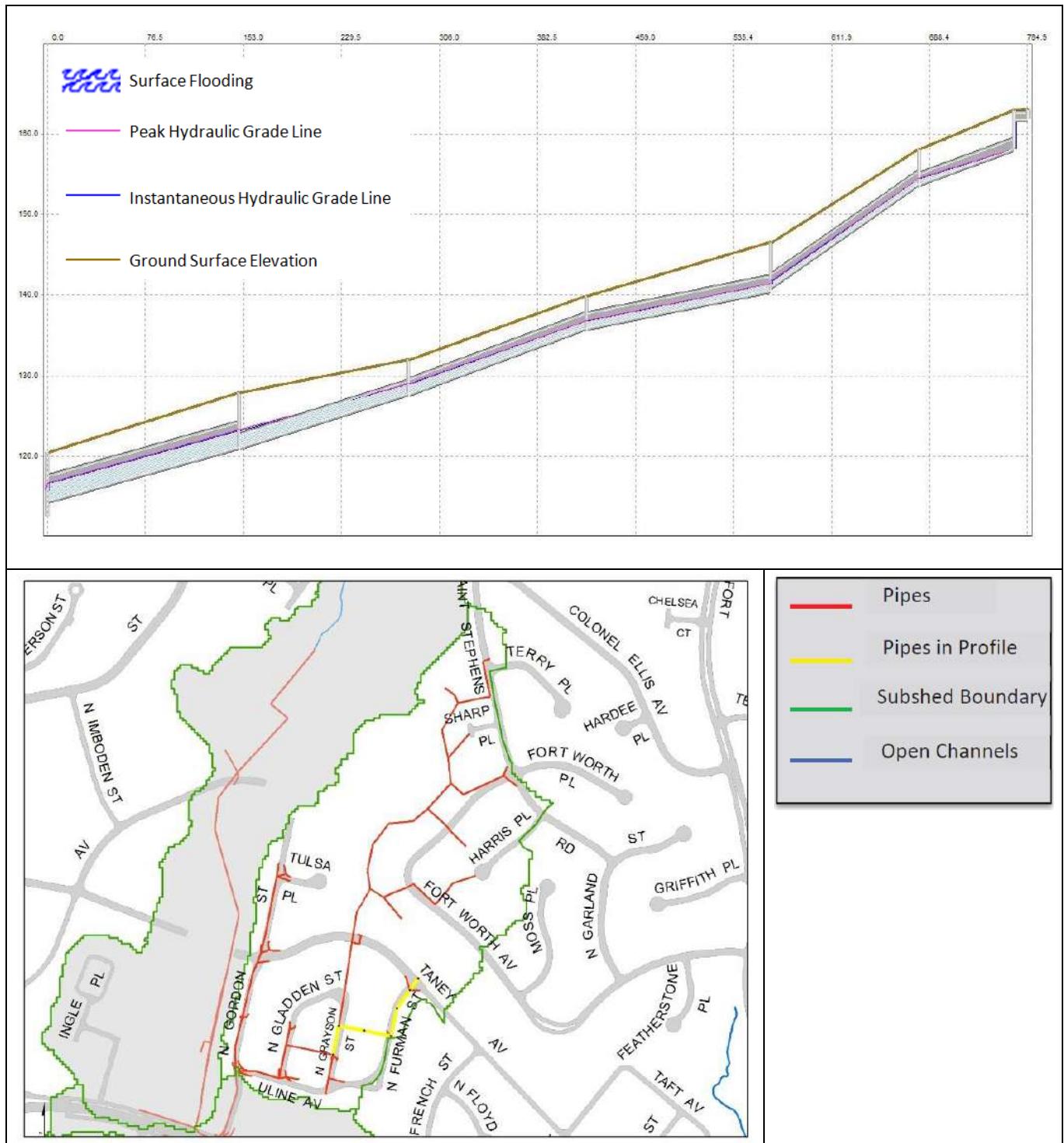


FIGURE 61

Cameron Run North Profile 11 from 002929ND to 001354IN

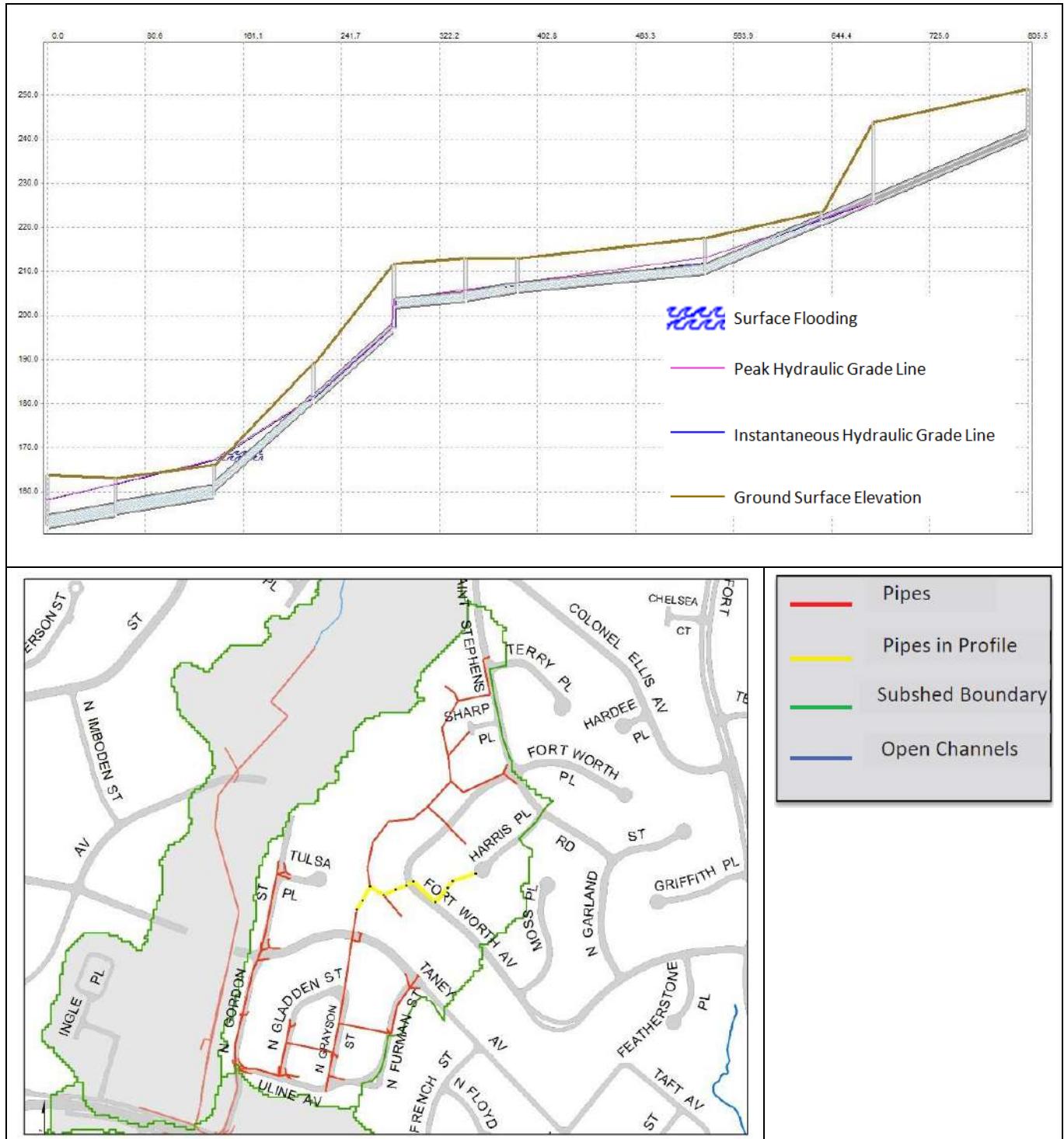


FIGURE 62

Cameron Run North Profile 12 from 002929ND to 002882IN

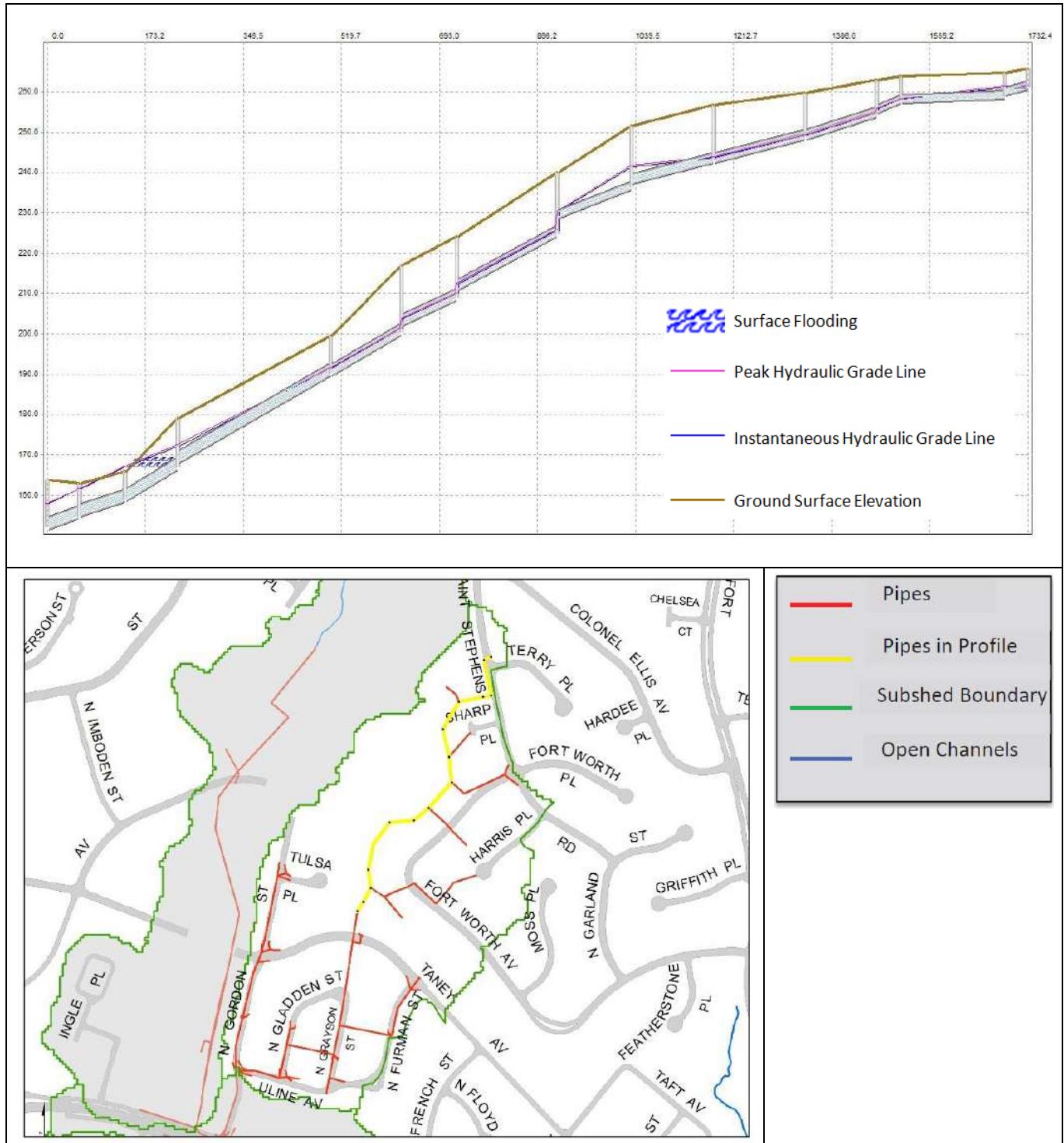


FIGURE 63

Cameron Run North Profile 13 from 004097SMH to 002313IN

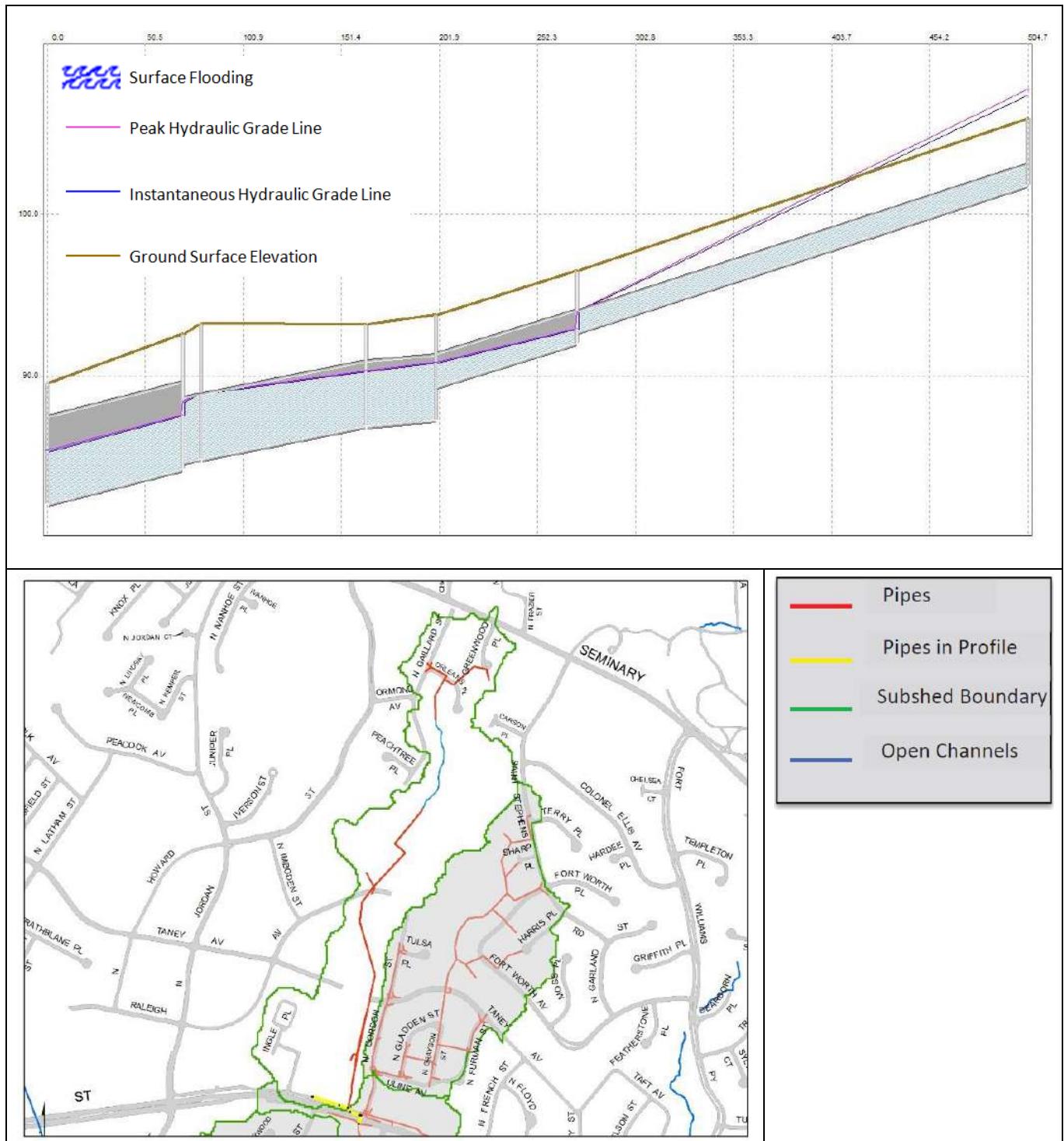


FIGURE 64

Cameron Run North Profile 14 from 000465SMH to 000461SMH

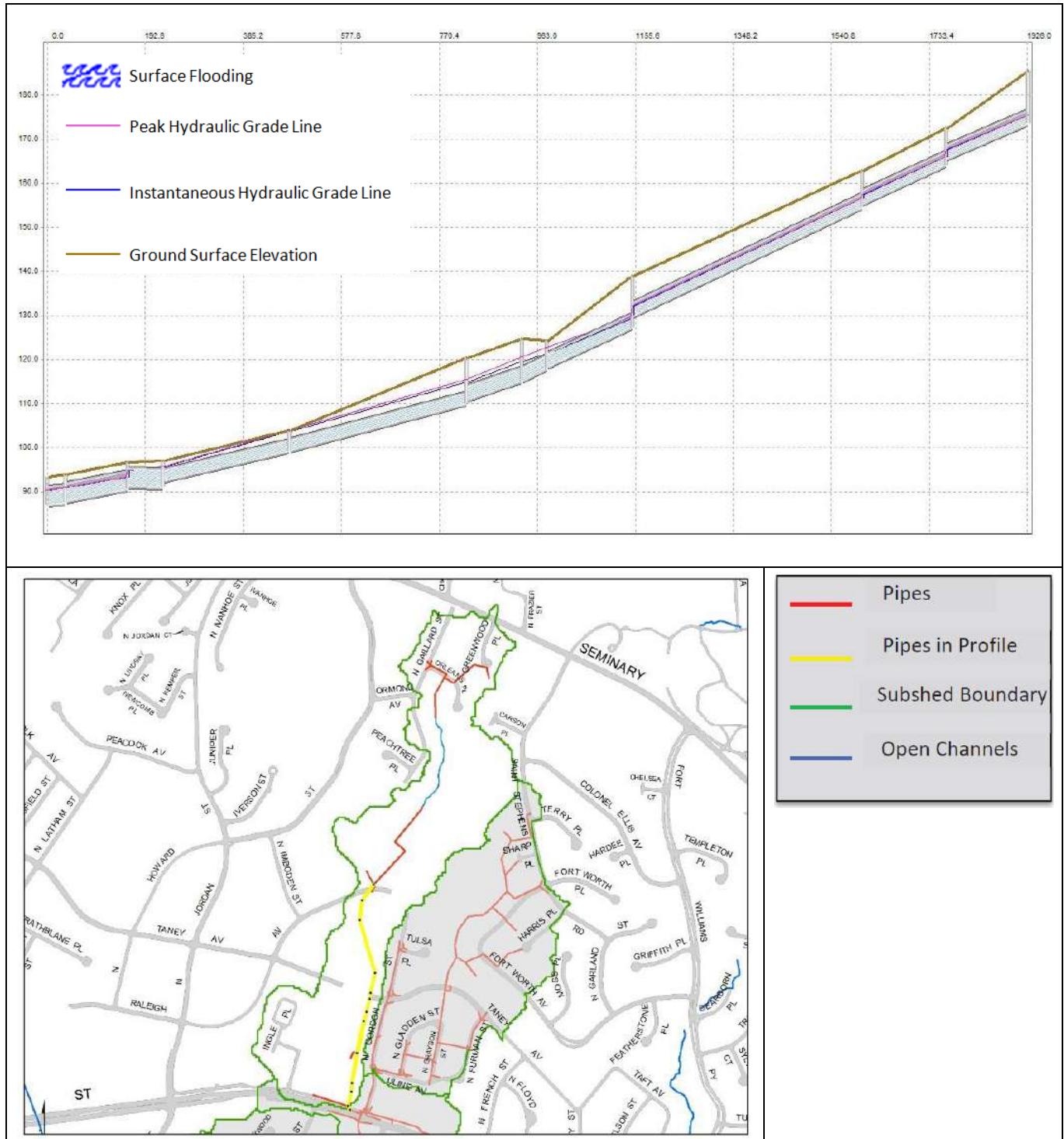


FIGURE 65

Cameron Run North Profile 15 from 000462SMH to 000178IO

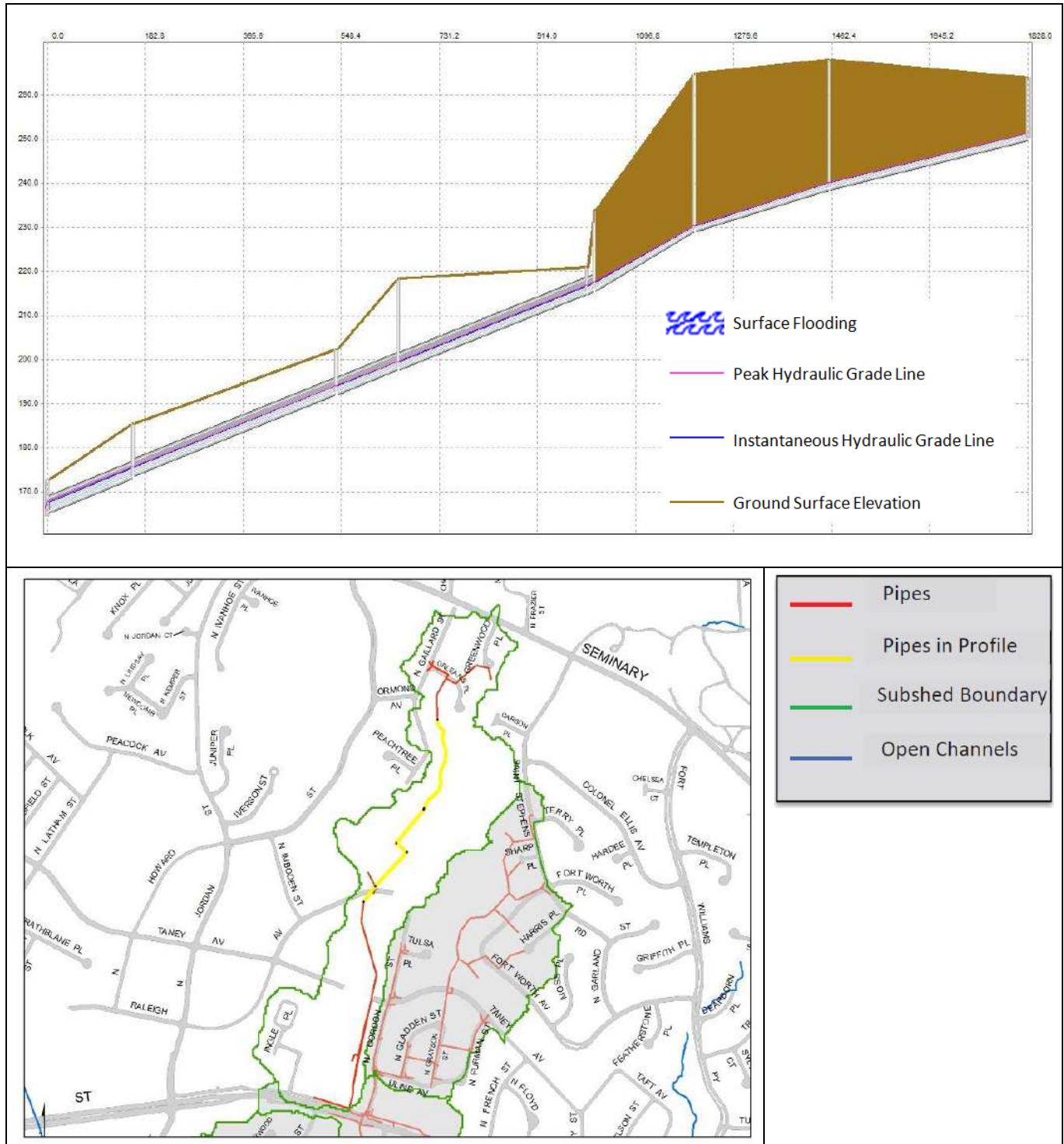


FIGURE 66

Cameron Run North Profile 16 from 000590IO to 002844IN

